THE KORFUND KOMMENTATOR

THE KORFUND COMPANY, INC., Long Island City 1, N. Y.

VOL. 9 NO. 1 *SPECIAL "NEGATIVE ISOLATION" ISSUE*

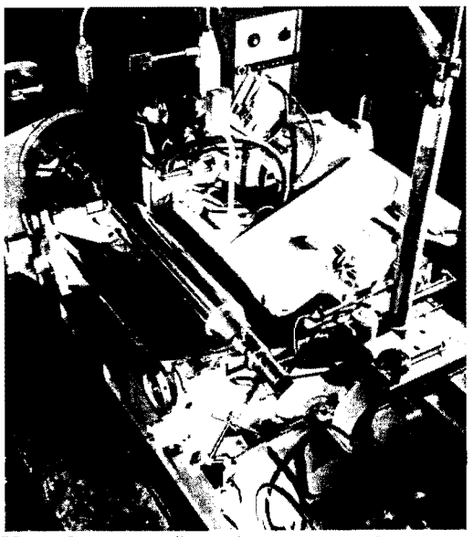
KAISER ALUMINUM "FLOATS" 75 TON ROLL GRINDER AND ITS 235 TON FOUNDATION ON KORFUND SPRING ISOLATORS

Hold tolerances of ± 0.0002" by protecting grinder against vibration and shock from foil mill

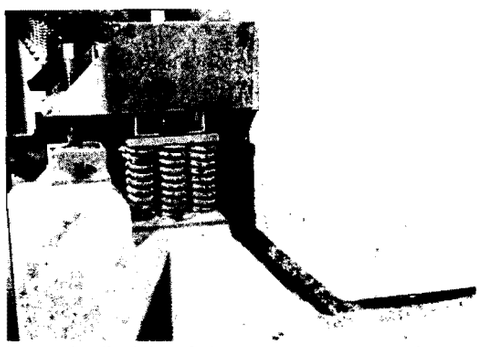
Reversing the usual problem of isolating a plant building from the shock and vibration of presses or other heavy machinery, Kaiser Aluminum & Chemical Corp.'s Permanente, Cal. foil mill had the problem of protecting an exceptionally high-precision unit from plant shocks and other external disturbances.

The 75 ton Cincinnati roll grinder for their new 60" rolling mill was mounted on a 235 ton concrete block, isolated from the main building foundations on Korfund Vibro-Isolators. Vibration and shock of all types are absorbed by the springs which "float" the grinder, permitting it to continue its precision work unaffected by other machinery.

Kaiser engineers felt the protection of a Korfund-suspended foundation was vital in view of the extremely fine tolerances required in grinding and polishing the mill rolls: ± 0.0002", and finish of 1.4 mu in. rms. The 45' long grinder handles rolls up to 192" long and 36" dia., and overhangs its foundation by 7 feet. It took 28 Korfund Isolators, each containing 9 coil springs, to float this grinder.



75-ton Cincinnati roll grinder in Kaiser's Permanente, Calif., foil plant. Korfund spring mountings insure the accuracy of performance built into the grinder by its manufacturer.



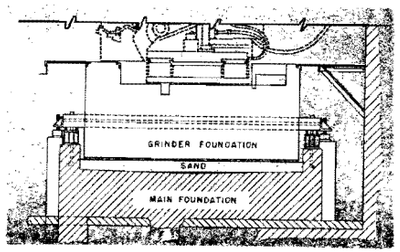
Corner detail of foundation suspension system, showing a 9-spring isolator and snubber assembly. 28 spring and 4 snubber assemblies were used to "float" this grinder foundation.

The foundation system, designed by Korfund, was completed in 2 stages. First, main foundations were poured as a solid block resting on bedrock, with a recess at the top to receive the smaller grinder foundation. Next, fourteen 10" steel beams to support the

(Continued on page 2)

PRECISION GRINDER AT KAISER ALUMINUM PROTECTED FROM ALL VIBRATION AND SHOCK

(Continued from page 1)



Cross section drawing of grinder foundation. Spring assemblies at each side suspend foundation, absorb all external vibration and shock. Snubber units prevent excessive motion. At floor level, steel plates provide access to grinder. All piping and other attachments linking grinder to plant are flexible.

grinder foundation were placed across the recess, and bolted to the isolator assemblies which rest on main foundation block. Side forms were built and concrete poured. When the concrete set, the isolator leveling bolts were turned uniformly, raising the grinder foundation and transferring the load to the Vibro-Isolators' springs.

Photos for this article were furnished by Kaiser Aluminum & Chemical Corporation. A very detailed article describing this Korfund engineered installation at Kaiser Aluminum Co. appeared in the July 1955 issue of Plant Engineering magazine.

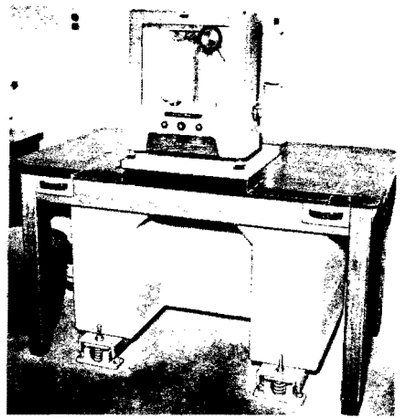
QUALITY

"There is hardly anything in the world that someone can not make a little worse and sell a little cheaper . . . and the people who consider price alone are this man's lawful prey."

—John Ruskin

Ever since the Korfund Company began serving industry, we have made no compromise with quality. Whenever only the BEST is considered good enough, quality is unmistakable. In the field of Vibration Control, Korfund upholds standards of craftsmanship that have made "KORFUND" synonymous with "QUALITY".

PROTECTING ACCURACY OF HIGHLY SENSITIVE INSTRUMENTS FROM EXTERNAL DISTURBANCES



Analytical Balance at Southwest Potash Corporation Carlsbad, New Mexico.

Now a really practical, highly effective method is available for protecting sensitive scientific instruments against vibration and shock. By mounting such instruments as analytical and micro-balances, spectrometers, spectrographs, electron microscopes, and electronic control panels, among other types of equipment, on Korfund Steel Spring Vibro-Isolators, vibration and shock from external sources can be definitely prevented from interfering with the accuracy of performance.

The photograph shows a delicate analytical balance in one of the laboratories of the Southwest Potash Corporation in Carlsbad, N. M. Protection against vibration and shock transmitted from the crushers and shakers in this large chemical processing plant is provided by mounting the balance on a concrete block which is supported on Korfund Steel Spring Vibro-Isolators.

The phantom view shows how the highest degree of accuracy is maintained by completely isoloting the concrete block from the table — enabling the operator to work at the table without disturbing the balance. The photo shows the built-in Isolator adjusting bolts which are used for precision leveling af the installation.

THE KOMMENTATOR

"BURIED" LABORATORY GROOVES GLASS

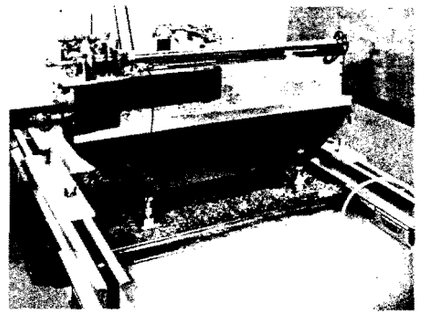
IN AN UNDERGROUND Laboratory at Rochester, N.Y., there's a machine so sensitive that if a person stands over it for a few minutes it may be thrown out of adjustment for many hours. The slightest temperature change may cause intolerable errors in its work.

This remarkable instrument of the Bausch and Lomb Optical Company is a ruling engine for making diffraction gratings. Its job is to cut grooves in a thin aluminum coating on glass, but its work is done with such precision that it may cut as many as 180,000 lines in a six-inch glass.

The heat from a person's body may expand the grating machine by as much as 1/10,000,000 inch, which may cause a "big" error in its work. Therefore, the instrument has been installed below ground in a room within a room, and elaborate precautions

The laboratory is built on solid rock with side walls 21 inches thick. The walls and ceiling are covered with sound absorbing material, and the floor measures 13 inches in thickness. The grating engine is mounted on a three-ton block of concrete and the entire mass is supported on vibration-absorbing steel springs. An Aluminum room has been built all around the instrument, so in effect it is floating in air. A special air-conditioning system prevents the temperature from varying more than 1/10 degree, and the humidity is kept very low. Thus the grating engine and the gratings upon which it works are almost free from disturbances of temperature, humidity and vibration. To isolate it further, some of the engine's operating parts are floated in mercury. The operotor remains outside the room when the machine is at work.

A diamond point engraves precise, parallel grooves in the aluminum coating. Just as important as the number of grooves per inch is the accuracy of spacing of grooves, for each groove must be cut in exactly the right position or the light reflected from it might cause an error in spectral analysis.



The diffraction-grating ruling engine is mounted on a concrete inertia block, which in turn is resiliently mounted upon the Korfund Vibro-Isolators (one is circled on photo). This system completely protects the machine from external disturbances.

Photomicrograph, token at a magnification of 20,000, shows just a few of the 50,000 ruled lines per inch.

Photomicrograph at 7900 magnification hos fewer lines. Line at right angle is a scratch in the glass.

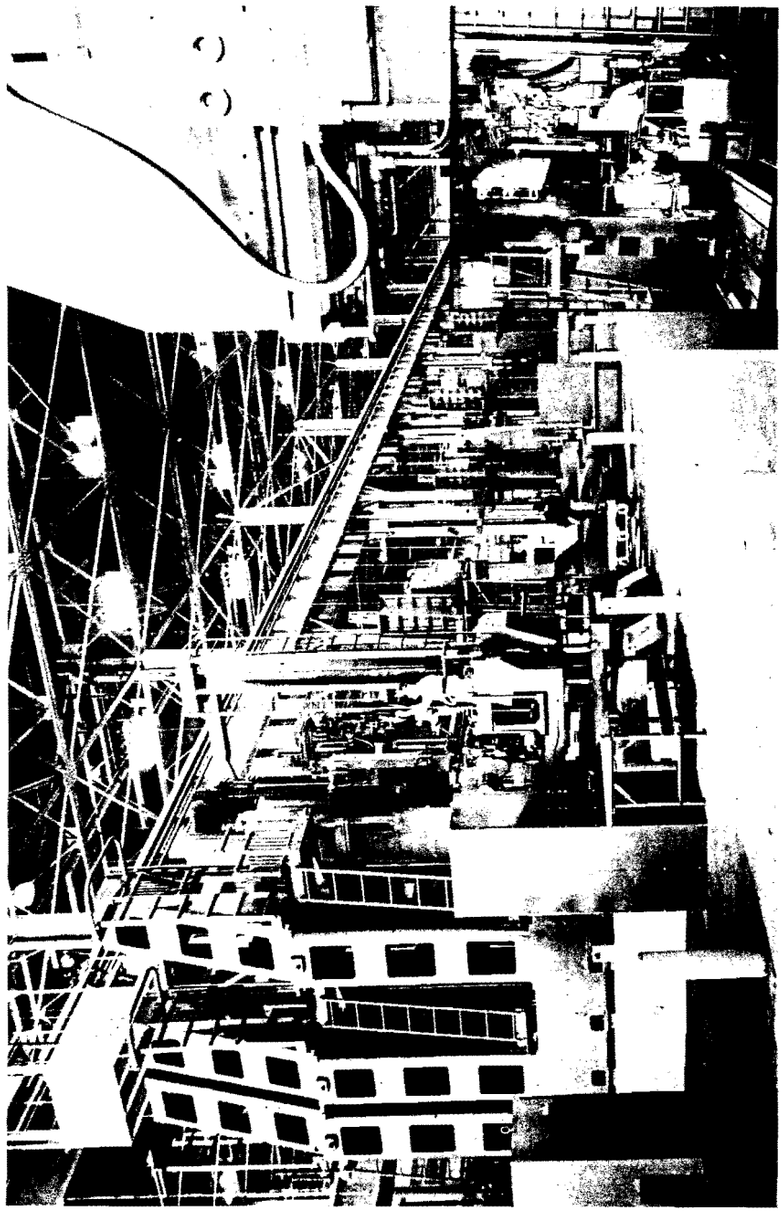


Photo shows a battery of giant die-sinkers in the U.S.A.F. Heavy Press Plant at the Cleveland Works, Aluminum Co. of America. They are part of an installation of 12 Cincinnati Hydrotels and Pratt & Whitney Kellers whose foundations float on Korfund Vibro-Isolators, thereby insuring their work accuracy and giving absolute protection against shock and vibration from nearby forging hammers, heavy presses, and trains. These machines, which cut forging cavities in steel blocks weighing up to 100 tons, weigh as much as 85 tons and their foundations as much as 317 tons.

Inset view shows close-up of 1 die-sinker. A metal finger traces contours of a forging's plaster model, and causes a matching impression to be sunk automatically into the steel die block (lower part of photo)

Photo 709-10

Order 53274

TREMENDOUS SAVINGS IN DOWN-TIME AND REPAIRS WHEN FURNACES ARE FLOATED ON KORFUND VIBRO-ISOLATORS!

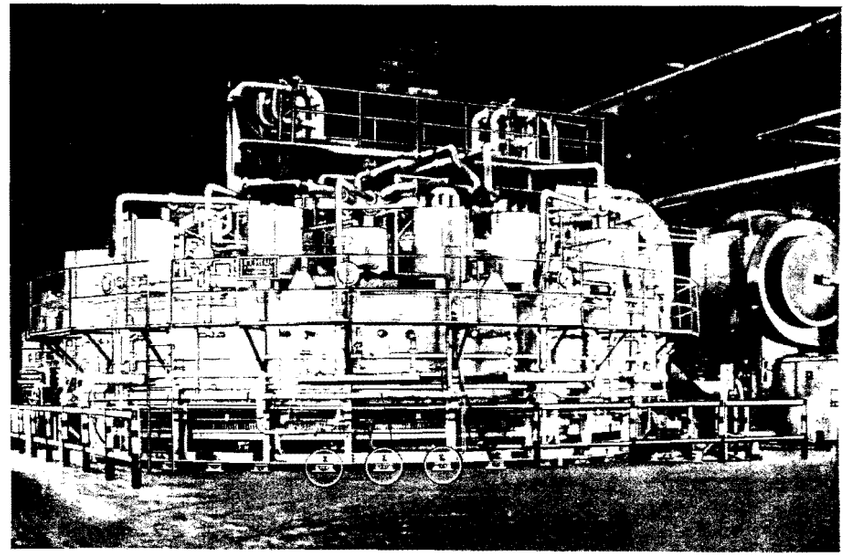


Photo shows a 30 foot diameter rotary hearth furnace made by the Lithium Company. This furnace "floats" on vibration isolators, and is protected from the damaging effects of disturbances created by forging hammers, presses, trucks, trains.

The most common application for vibration isolators has been to prevent the transmission of disturbance from equipment — disturbance that is detrimental to the building, nearby sensitive equipment, ar personnel. It is not always feasible to isalate existing installations, ar the disturbing source can't be isolated, as with passing trains or trucks.

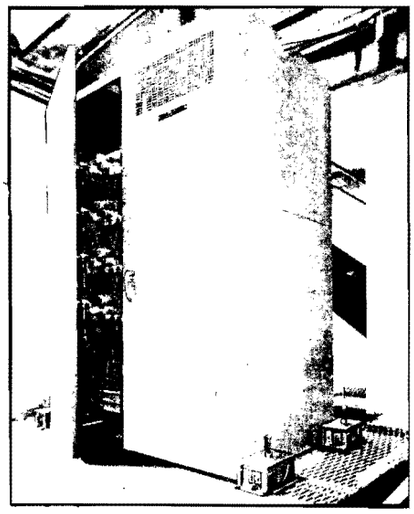
In such cases, we "float" the sensitive equipment on spring mountings, effectively isolating it from interference which could damage its functians or its components. A case in point is the rotary hearth furnace shown in a plant of one of the largest automotive manufacturers. It is located next ta a forging press — other forging operations are also conducted nearby.

To prevent premature destruction of the firebrick ceiling, Lithium Company recommended that Korfund spring isolators be supplied when the furnace installation was made. (Two similar furnaces are also mounted thus in this plant.) Firebrick life of this Karfund-protected furnace is substantially greater than it is for rigidly mounted furnaces operating under the same rigorous conditions. Many customers report that the life of furnace arches and tops has been increased 2½ to 3 times after mounting the equipment on Korfund Vibro-Isalators.

The tremendous savings realized in this manner become immediately apparent, since the productive period before the furnace must be shut down for repairs is twice as long. It takes time to caol the furnace, it takes time ta repair it, it takes time to reheat. And taday, when production schedules MUST be met, time makes all the difference between profit and loss in many cases.

The same principles of protecting vibration-sensitive equipment from outside disturbances apply whether it is a furnace, micrabalance, jig borer, lathe, anechaic chamber, or roll grinder which must be pratected.

NOW OPERATE SENSITIVE ELECTRONIC EQUIPMENT WITH FREEDOM FROM EXTERNAL DISTURBANCE



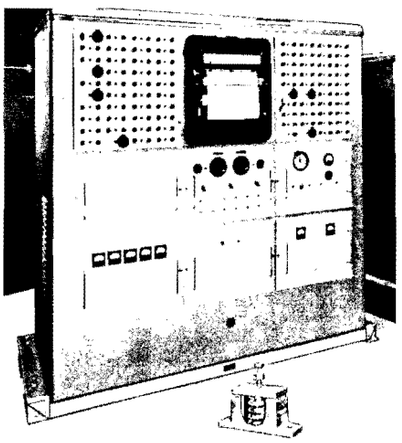
Westinghouse Paper Mill Speed Regulator at Gould Paper Company, Lyons Falls, New York

Delicate electronic instruments and other sensitive equipment often perform inaccurately because of disturbances transmitted to the equipment. Typical sources of disturbance are trucks, trains, machinery.

The Speed Regulator pictured above is located on a steel control landing in a paper company. Its accuracy could be affected by the many sources of vibration and shock present in a paper mill, including pumps, compressors, roll grinders and the paper making machine itself. By resiliently mounting this control cabinet on Korfund Vibro-Isolators, all external tremor is prevented from interfering with the accuracy of operation. To filter out high frequency disturbances, Elasto-Rib pads were used beneath the isolators. The structural steel saddles shown were used to maintain original installation height.

Rapid leveling — without shims — is accomplished with built-in adjusting bolts, a Korfund feature for over 30 years.

CRUCIBLE STEEL CO. PROTECTS ACCURACY OF PRODUCTION CONTROL QUANTOMETER



Quantometer at Crucible Steel Company, Syracuse, N. Y.

The Production Control Quantometer above is installed in the Chemical Laboratory of the Sanderson-Halcomb Works, Crucible Steel Company of America. This modern spectrographic instrument for precision analysis of a wide range of metals gives the company better control over the chemical characteristics of individual "heats". The spectrograph-quantometer enables the metallurgist to see, on paper, the exact composition of a particular melt of an alloy.

This sensitive analysis unit must be kept in an air conditioned room with controlled temperature and humidity to help insure accurate readings. Vibrations and shock from passing trains, trucks, and from disturbance-generating equipment within the plant would have adversely affected the precision of the Quantometer. To protect the equipment from external disturbance, Korfund steel spring Vibro-Isolators were used to "float" it resiliently. The structural steel cradle on which the recording console is mounted keeps the installation height at a minimum. Leveling of the equipment is simplified by the Isolator adjusting bolts.

This Quantometer now operates with the accuracy built into it by its manufacturer, regardless of vibration and impact from the equipment found in a steel plant.

The Use of Vibration and Shock Control in Reducing Noise Levels*

DONALD H. VANCE

THE KORFUND COMPANY, INC.

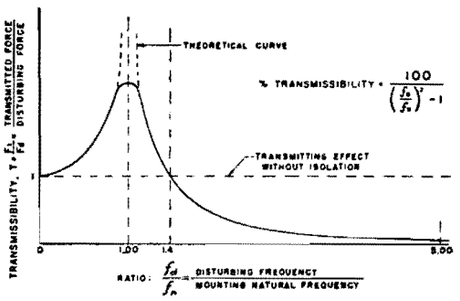


FIG. 1. Transmissibility *vs* frequency ratio. This curve applies to steel spring isolators and to other materials with very little damping, which increases the transmission. The footnote to equation 1 gives an approximate correction for damping in organic materials.

VIBRATION and shock control for machinery in some cases provides virtually a complete solution to the problem of transmitted noise. This is particularly true if the problem is noise transmission to the floor below the machinery and, to a lesser degree, to the rooms adjoining a machinery room, or if the problem involves vibration and noise transmission through pipe lines. However, in most cases vibration and shock control for the equipment is not a complete solution, but is only a part of the overall treatment required in a successful noise reduction program. For example, resilient machinery mountings are often used in conjunction with acoustical baffles, sound hoods, acoustical treatment of walls, or other methods in order to produce the desired reduction in noise levels. In many cases the cost of resilient mountings is so low compared to the cost and inconvenience of the other types of noise reduction treatment that it often pays to start with installation of resilient mountings before going to the more expensive and more complicated forms of treatment. Although resilient mountings are most effective in preventing transmission of structure-borne noise, they are also useful in reducing noise levels within the machinery room itself as illustrated later in this paper.

* An address before the sixth annual National Noise Abatement Symposium in Chicago, October 20–21, 1955.

Theory of Vibration Control

A very simple equation applies to determining the transmission of steady-state vibration, the constantly repeating sinusoidal wave form of vibration generated by such equipment as fans, compressors, engines, and pumps:

$$\text{Transmissibility, } T, = \frac{F_t}{F_d} = \frac{1}{\left(\frac{f_d}{f_n}\right)^2 - 1} \quad (1)^{**}$$

where f_d = frequency of disturbing vibration, cycles per minute (cpm)

f_n = natural frequency of the resiliently mounted system, cpm

F_d = unbalanced force acting on the resiliently supported system

F_t = force transmitted through the resilient mountings

$$f_n = 188\sqrt{\frac{1}{d}} \quad (2)$$

where d = static deflection of the resilient mounting in inches

$$d = \frac{W}{k} \quad (3)$$

where W = weight on the mounting

k = stiffness factor of the mounting in lbs/in. of deflection.

** This equation is exact for steel springs because they have straight-line load deflection characteristics and negligible damping. When the equation is used for organic materials, the following corrections will normally give conservative results: For rubber and neoprene, use 50 percent of the static deflection when calculating f_n. For cork, use f_n equal to one and one-half times the natural frequency determined by actual test.

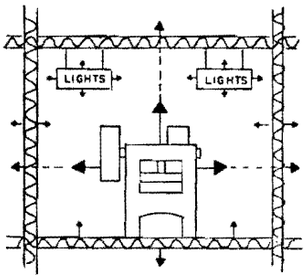
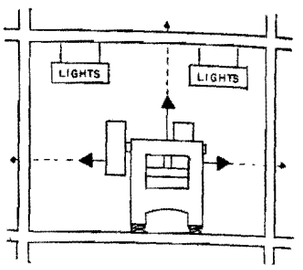


FIG. 3. Solidly mounted press at left transmits shock and high-frequency noise into the floor. The shock causes floors, walls, and lights to vibrate and act as secondary noise sources, in addition to the normal airborne noise transmitted from the press. With shock-mounted press at right, all structural vibration and noise transmission is stopped and secondary noise sources are eliminated.



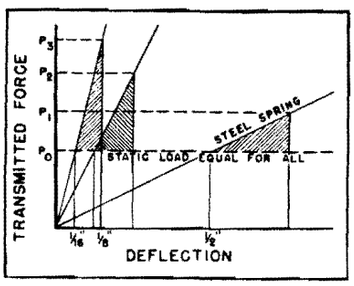


FIG. 4. Force transmitted through shock mountings. The graph shows the load deflection curve for a typical steel spring and also for two stiffer mounting materials, such as rubber in shear and rubber in compression. Steel spring mountings for shock applications are selected to give a static deflection of at least 1/2 in. compared to 1/16 in. to 1/8 in. for other isolating materials. The shaded portions of the graph represent equal amounts of shock energy delivered by the punch press or hammer to each type isolation material initially subjected to the same static load (P_0). The steel springs deflect more and transmit much less force (P_1) to the subbase than is transmitted through the more rigid materials (P_2, P_3).

The natural frequency,† f_n, of a resiliently mounted system is the frequency at which it will oscillate by itself if a force is exerted on the system and is then released. This can be illustrated by suspending a weight from a very long rubber band. The longer the rubber band, the more deflection the weight produces in it. If the weight is then pulled down slightly by hand and released, it will oscillate up and down at the natural frequency of the system. The more deflection in the system, the lower is the natural frequency of the system. The importance of this can be seen by re-

†A system may have up to six natural frequencies, but it will be found that in the practical selection of machine mountings, if the vertical natural frequency of the system is made low enough for a low transmissibility, the horizontal and rotational natural frequencies will generally be lower than the vertical and can be disregarded except on machines with very large horizontal unbalanced forces or with large unbalanced moments, e.g., horizontal compressors, large two-, three- and five-cylinder engines, etc.

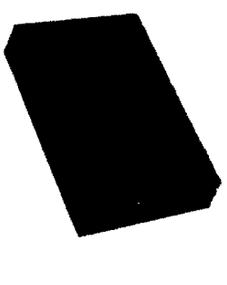
examining equation 1 re-written in the following form:

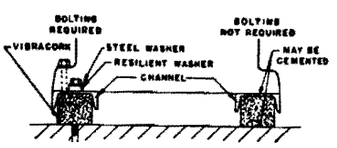
$$F_t = F_d \left[\frac{1}{\left(\frac{f_d}{f_n}\right)^2} - 1 \right] \qquad (4)$$

Obviously, we want to minimize the transmitted force, F_t. Since the disturbing force, F_d, is a function of the machine characteristics and cannot be reduced except by dynamic balancing of the machine (or by reducing the operating speed, which is seldom practical) the transmitted force can be reduced only by minimizing the function

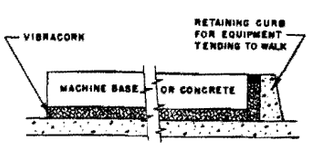
$$\frac{1}{\left(\frac{f_d}{f_n}\right)^2 - 1}$$

This can be accomplished only by increasing the frequency ratio, f_d/f_n. However, since the disturbing frequency, f_d, is fixed for any given machine and is a function of the rpm, it can seldom be changed. The only remaining variable is the mounting natural frequency, f_n.

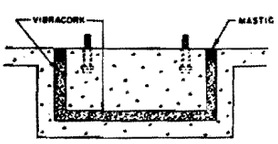




Using channels to apply load to Vibracork for light machinery



Continuous layer of Vibracork for heavy machinery and concrete foundations above floor line



Vibracork for isolation of equipment on concrete foundation below floor line

FIG. 5. Typical cork arrangements. Machinery-isolation cork is usually made in three densities for loadings from 1000 to 8000 lbs per ft². Standard sheet size is 12 in. by 36 in. in 1-in., 2-in., and 3-in. thicknesses. Most frequent application is under concrete foundations.

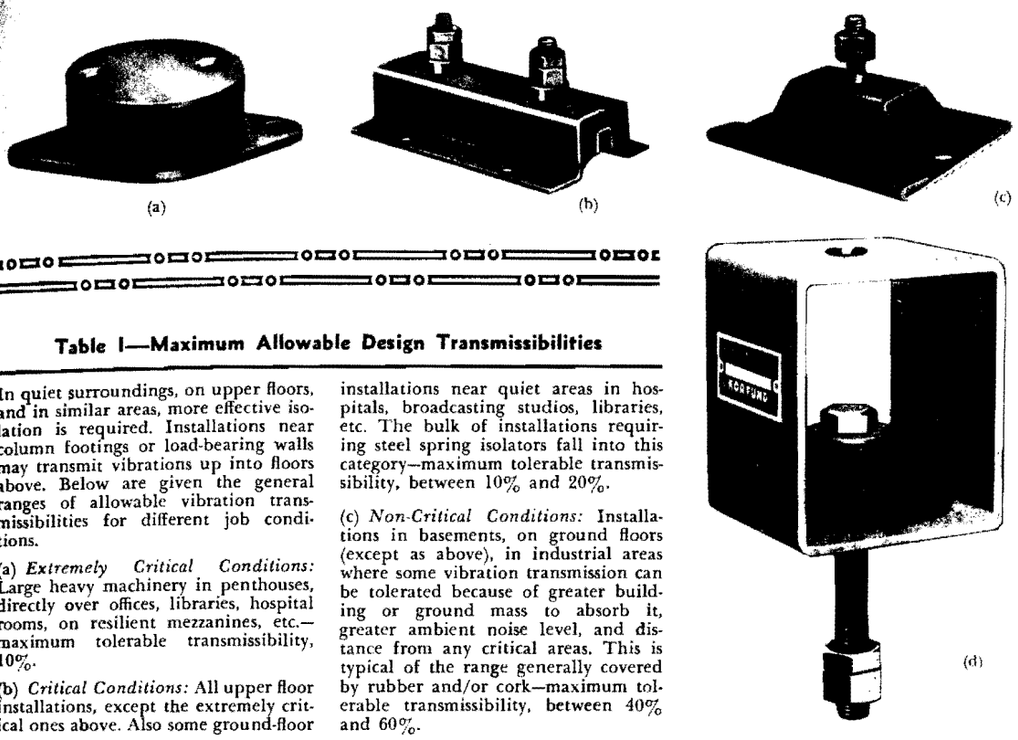


Table I—Maximum Allowable Design Transmissibilities

In quiet surroundings, on upper floors, and in similar areas, more effective isolation is required. Installations near column footings or load-bearing walls may transmit vibrations up into floors above. Below are given the general ranges of allowable vibration transmissibilities for different job conditions.

(a) *Extremely Critical Conditions:* Large heavy machinery in penthouses, directly over offices, libraries, hospital rooms, on resilient mezzanines, etc.—maximum tolerable transmissibility, 10%.

(b) *Critical Conditions:* All upper floor installations, except the extremely critical ones above. Also some ground-floor installations near quiet areas in hospitals, broadcasting studios, libraries, etc. The bulk of installations requiring steel spring isolators fall into this category—maximum tolerable transmissibility, between 10% and 20%.

(c) *Non-Critical Conditions:* Installations in basements, on ground floors (except as above), in industrial areas where some vibration transmission can be tolerated because of greater building or ground mass to absorb it, greater ambient noise level, and distance from any critical areas. This is typical of the range generally covered by rubber and/or cork—maximum tolerable transmissibility, between 40% and 60%.

Reducing f_n by increasing the static deflection of the resilient mountings reduces the vibration transmission. This explains why the efficiency of machinery mountings increases as their resiliency and deflection increases.

Figure 1 shows the effect of varying frequency ratios on the transmissibility. Note that for $f_d/f_n < \sqrt{2}$, the use of mountings actually increases the transmissibility above that which would result if no isolation were used and the machine were bolted down solidly. In fact, if careless selection of the mount results in a mounting natural frequency equal, or nearly equal, to the disturbing frequency, a very serious condition called *resonance* occurs; in equation 4 the denominator of the transmissibility function becomes zero and the transmitted force, F_t, theoretically becomes infinite. As the ratio f_d/f_n decreases beyond $\sqrt{2}$, the resilient mountings reduce the transmitted force. Table I gives some suggested maximum design transmissibilities for different types of job conditions.

FIG. 6. Typical rubber and rubber-cork mountings. Load capacities of rubber mountings vary with their size, type, and rubber durometer. Approximate maximum deflection is 1/4 in., though some mountings can be stacked to increase the deflection. (a) Compression mountings support more weight per unit of area but require greater thickness of rubber to get the same deflection obtainable with a smaller volume of rubber when loaded in shear. (b) Pure shear mountings must not be overloaded, or the rubber-to-metal bond may fail. (c) Combination compression and shear mountings are more durable than pure shear mountings if overloaded. (d) Rubber-in-shear hangers for suspended equipment and piping. (e) Rubber-cork mountings combine characteristics of these two materials, provide non-skid surface which eliminates bolting machines down. (f) Rubber-cork mounting with built-in leveling screw.

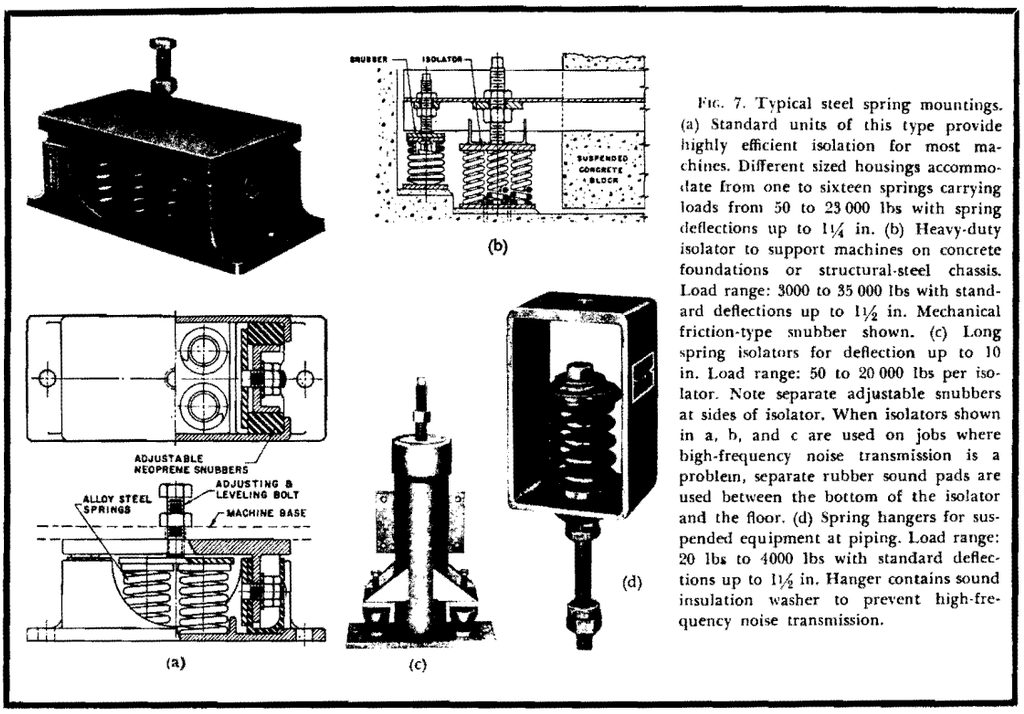


FIG. 7. Typical steel spring mountings. (a) Standard units of this type provide highly efficient isolation for most machines. Different sized housings accommodate from one to sixteen springs carrying loads from 50 to 23 000 lbs with spring deflections up to 1¼ in. (b) Heavy-duty isolator to support machines on concrete foundations or structural-steel chassis. Load range: 3000 to 35 000 lbs with standard deflections up to 1½ in. Mechanical friction-type snubber shown. (c) Long spring isolators for deflection up to 10 in. Load range: 50 to 20 000 lbs per isolator. Note separate adjustable snubbers at sides of isolator. When isolators shown in a, b, and c are used on jobs where high-frequency noise transmission is a problem, separate rubber sound pads are used between the bottom of the isolator and the floor. (d) Spring hangers for suspended equipment at piping. Load range: 20 lbs to 4000 lbs with standard deflections up to 1½ in. Hanger contains sound insulation washer to prevent high-frequency noise transmission.

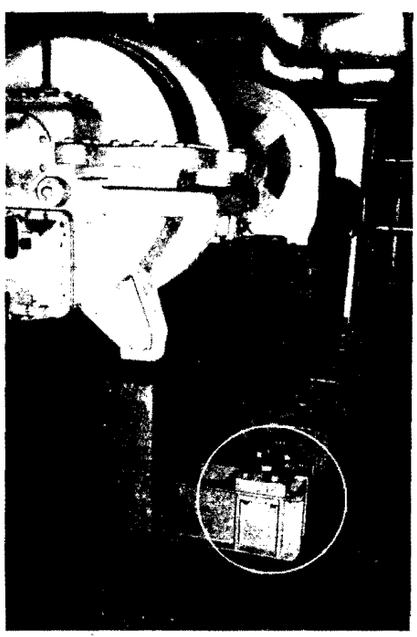


FIG. 8. Spring isolators limit vibration transmission to less than 5 percent on large centrifugal refrigeration machine installations on upper floors of apartments and offices, prevent transmission of structure-borne noise and vibration which otherwise induces resonance vibration in structural elements on floors below, with resulting secondary noise.

Figure 2 shows a chart which can be used to select the proper resilient mountings when the following job characteristics are known: weight per mounting, disturbing frequency, and design transmissibility. The chart shows the limitations of the various types of isolation materials, particularly helpful data in selecting the proper media.

Shock Absorption for Impact Machines

In addition to the loud noise produced when the dies strike the work, impact machines such as punch presses, drop hammers, forging hammers, and similar machines also create noise generated by the transient high-frequency vibration of the press parts induced by the initial shock. A secondary noise source results from floor and wall panels vibrating as diaphragms when set in motion by the initial shock. Structural transmission of the initial shock with accompanying noise, and generation of the secondary noise can be eliminated through the use of resilient mountings under these impact machines (see Fig. 3). However, these mountings are not selected on the basis of the data and equations shown above. In shock absorption, the mountings change the sudden damaging impact to a smaller, gradually applied force. In shock mountings, the natural frequency of the mountings is actually greater than the disturbing frequency, or strokes per minute, of the impact machines. Figure 4 illustrates that the more resilient mountings, providing more static deflection, re-

† SEE INSERT, KORFUND VIBRATION ISOLATION CALCULATOR, SA-2028-0.

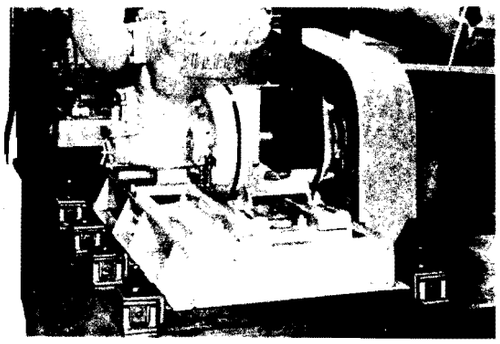


FIG. 9. These two compressors are installed on the eleventh floor of the Pathe Television Center, New York City. The rubber-in-shear rails originally used were not the proper isolation for the floor conditions and low-frequency vibration. Consequently, transmission through these mountings was so high that it was impossible to use office space on the floor below, as vibration and noise transmitted through the building were picked up on film sound tracks several floors down. Steel spring isolators provided the deflection required to stop the transmission, and the structural-steel saddles shown were used in this case so that the original piping could remain unchanged.

sult in smaller forces transmitted through the mountings. Since resonance must be avoided in shock absorption too, the calculator in Fig. 2 contains a line marked "For Shock Absorption Stay Above This Line."

Types of Vibration and Shock Mountings

Cork was the original vibration and noise isolation material and has been used for this purpose for at least a hundred years. The most widely used form of cork today is compressed cork made of pure granules of cork without any foreign binder, compressed and baked under pressure with accurately controlled density. Cork can be used directly under machines, but its widest application is under concrete foundations (see Fig. 5). It is not affected by oils, acids normally encountered, or temperatures between 0° F and 200° F, but it is attacked by strong alkaline solutions and will rot under continuous cycles of moistening and drying. Cork under concrete foundations still giving good service after twenty years indicates a long, useful life when properly applied. Cork is fairly good as a low-frequency shock absorber, but its use as a vibration isolator is limited to frequencies above 1800 cycles per minute. Cork has good sound-insulation characteristics. Because of the large amount of damping in cork, the natural frequency cannot be computed from the static deflection and must be determined in tests by vibrating the cork under different loads to find the resonance frequency, which establishes the natural frequency of the material. The limiting values for cork given

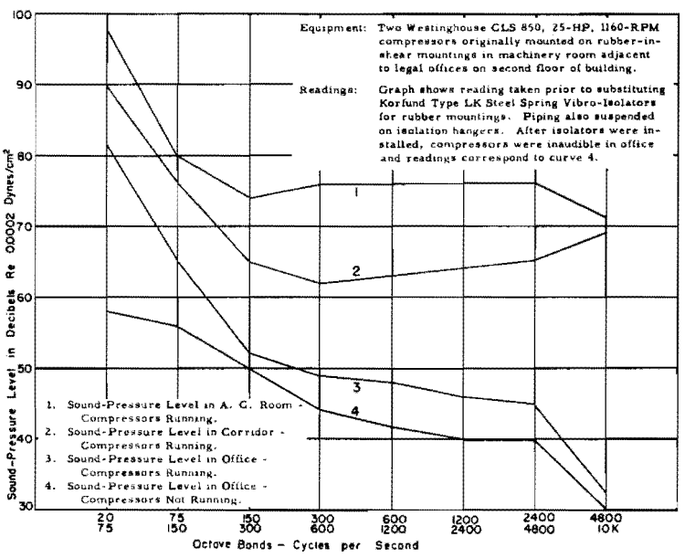


FIG. 10. Sound-level readings before and after installation of steel spring isolators under reciprocating compressor on upper-floor installation. (Data courtesy of Michael J. Kodaras, Acoustical Consultant, New York City.)

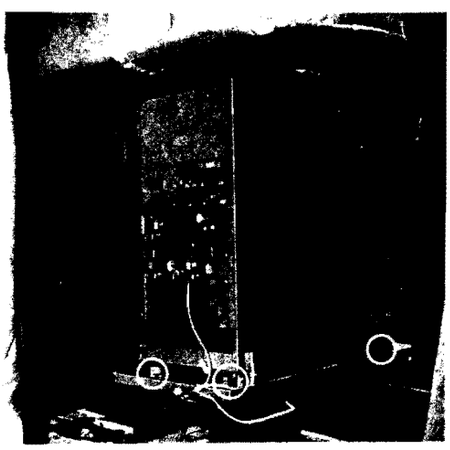
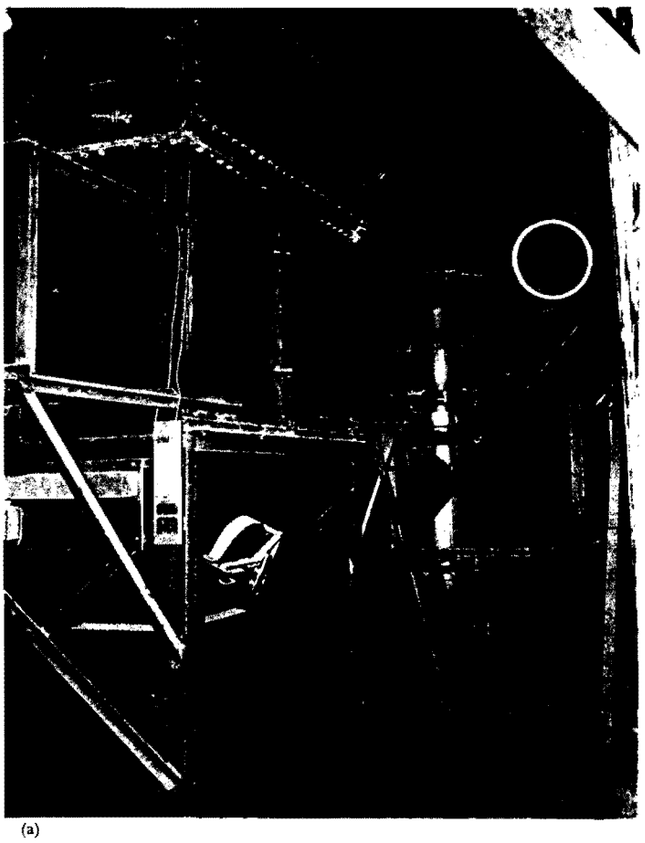
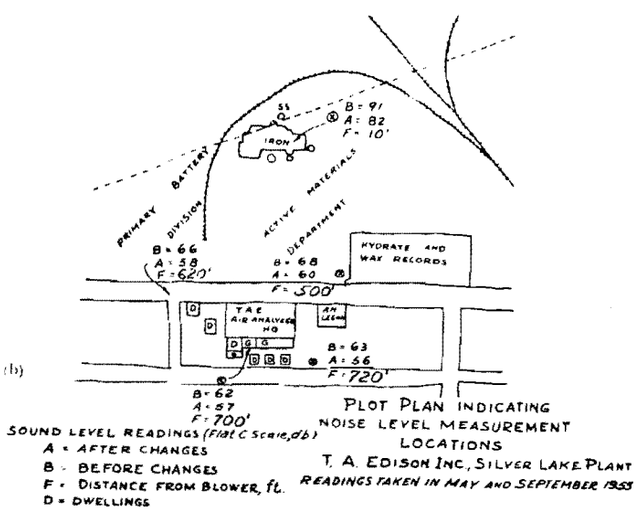


FIG. 11. Heat pump installation in attic directly over bedroom of wood frame house. Noise transmission resulting from lightweight wood joist construction made it impossible to sleep in the bedroom below until vibration isolators were installed as shown. Since the mountings must be much more resilient than the floor to be effective, at least one inch of spring deflection is required on an installation of this type.



(a)



(b)

FIG. 12. (a) Large exhaust fan on overhead steel structure in corrugated sheet-metal building at T. A. Edison Inc. plant generated noise which disturbed residents nearly 700 ft away, particularly at night. Corrective measures included strengthening of the structure, replacement of steel deck (which could vibrate like a diaphragm) with open grill work, and use of steel spring mountings to stop transmission of vibration to the sheet-metal building walls to prevent their acting as secondary sound sources. Results are shown in (b).

in Fig. 2 were determined in this manner.

Rubber has very good sound-insulation characteristics, is fairly good for low-frequency shock absorption, and is useful as a vibration isolator for frequencies above 1200 cpm. Typical rubber mountings and combination rubber and cork mountings are illustrated in Fig. 6. Rubber is not affected by acids or alkalis, but is not recommended for use in the presence of sunlight. The temperature range of natural rubber is 50 to 150° F; that of neoprene, 0° to 200° F. Neoprene rubber is recommended for applications where there is continuous exposure to oil. Special rubber compounds are available to meet conditions beyond those cited. Rubber tends to lose its resiliency as it ages. The useful life of rubber mountings is about seven years under non-impact and about five years under impact applications, though it retains its sound insulation value for much longer. Individual molded-rubber mountings are generally economical only with the light and medium-weight machines, since heavier-capacity mountings approach the cost of the more efficient steel spring isolators. Pad-type rubber isolation has no such limitations.

Steel spring isolators provide the most efficient method of isolating vibration and shock, approaching 100-percent effectiveness. The higher efficiency is due to the greater deflections which they provide: standard steel spring isolators such as those shown in Fig. 7 provide deflections up to 1¼ in. compared to about 1/4 in. maximum

for rubber and other materials, while special steel spring isolators can give deflections up to 10 in. Since the performance of steel springs follows very closely the equations of vibration control, their performance can be very accurately predetermined, eliminating costly trial and error which is sometimes necessary in other materials. Steel spring isolators are generally equipped with adjustable snubbers, since steel springs themselves contain no damping. (Damping is sometimes useful in limiting the movement of resiliently mounted machines, but damping reduces the isolation efficiency of the mounting.) Most steel spring isolators are equipped with built-in leveling bolts, which eliminate the need for shims when installing machinery. The more rugged construction possible in steel spring isolators provides for a long life usually equal to that of the machine itself. Since high-frequency noises sometimes tend to by-pass steel springs, rubber sound-isolation pads are usually used under spring isolators to stop such transmission into the floor on critical installations.

Table II tabulates the useful range of cork, rubber, and steel springs for different equipment speeds.

Applications

Figures 8 through 16 illustrate the application of resilient machinery mountings to prevent transmission of structure-borne noise and vibration. Properly designed mountings now permit installation of the heaviest mechanical equipment in penthouses on roofs directly over offices and sleeping areas. The FHA has approved the use of machinery penthouses on several apartment installations when all equipment was to be mounted on high-efficiency steel spring isolators. Such upper-floor installations permit certain operating economies and release valuable basement space for garaging automobiles. When heavy machinery is installed on upper floors, great care must be used to prevent vibration transmission which often shows up many floors below when a wall, ceiling, or even a lighting fixture happens to have the same natural frequency as the disturbing vibration. The result of such resonance vibration is very annoying noise. Efficient mountings permit lighter, more economical construction of new buildings and prevent

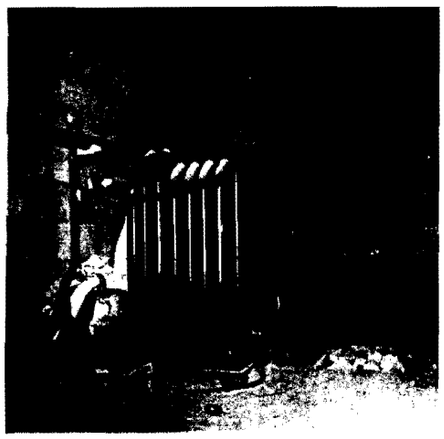


FIG. 13. Large transformers installed in congested hotel areas of Miami created problems because the vibration carried through the buildings resulted in annoying noise. Installation of combination rubber-cork mountings solved the problem. (Photograph courtesy of Florida Light and Power Company.)

FIG. 14. Sound-level readings taken with a machine solidly and resiliently mounted. Note that the mountings are effective primarily at the lower frequencies, the range in which acoustical treatment is least effective. (From *Handbook of Noise Measurement*, General Radio Company, Cambridge 39, Massachusetts.)

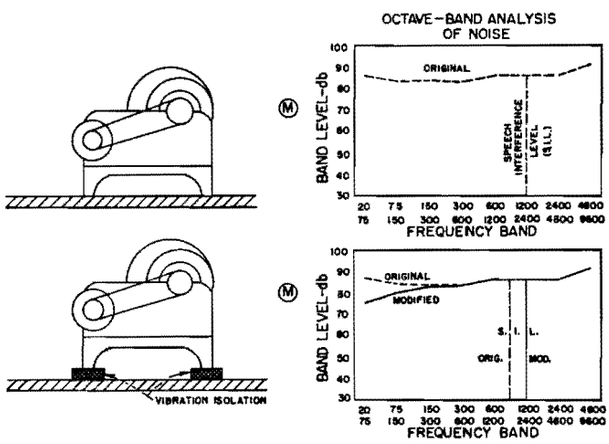


Table II—The Relative Effectiveness of Steel Springs, Rubber, and Cork in the Various Speed Ranges.

Range	rpm	Springs	Rubber	Cork
Low	Up to 1200	Required	Not recommended except for shock *	Unsuitable except for shock *
Medium	1200–1800	Excellent	Fair	Not recommended
High	Over 1800	Excellent for critical jobs	Good	Fair to good

* For non-critical installations only; otherwise, springs are recommended.

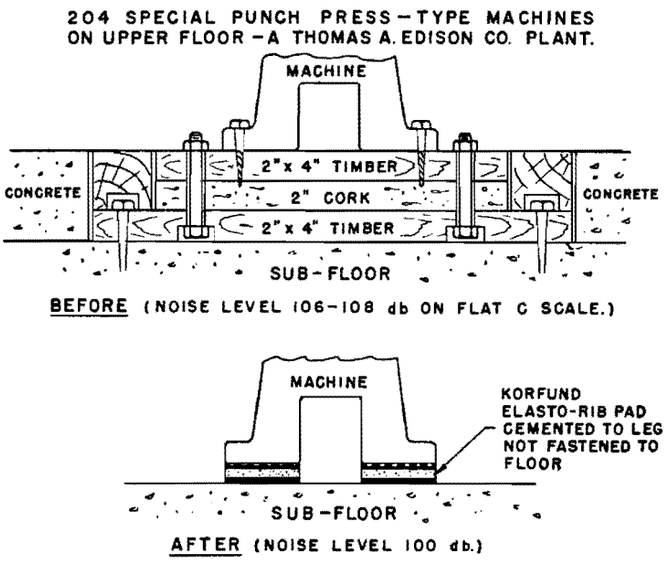


FIG. 15. Substantial noise reduction in the machinery room itself was obtained by eliminating foundation bolts and mounting 204 of these machines on rubber-cork mounts. (Data courtesy of Mr. Kenneth Huck, T. A. Edison Company.)

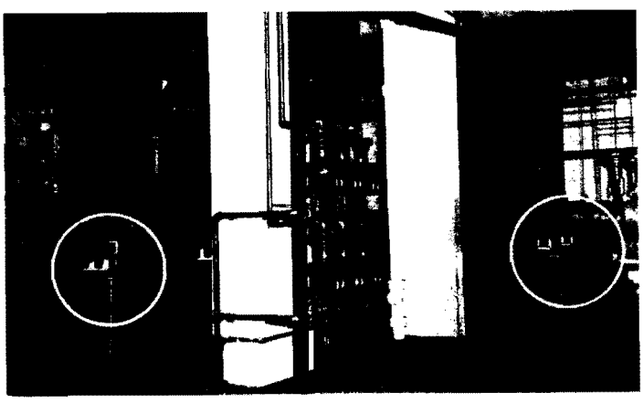
difficulties when machinery is installed on the new concrete-filled ribbed metal deck floors. They also permit installation of heavy machinery in old buildings which were not originally designed to accommodate such equipment.

Steel spring isolators resting on rubber sound pads are used on practically all anechoic room installations to prevent transmission of structure-borne vibration and noise into these sound rooms. Vibration and noise transmission through piping, particularly on air-conditioning installations, is a serious problem. When refrigerating compressors are installed on resilient mountings, provision should be made for flexibility in the discharge and intake piping to reduce vibration transmission. This can be accomplished either through the use of flexible metallic hose (which must be of adequate length and very carefully installed in strict accordance with the manufacturer's specifications) or by providing for flexibility in the piping itself. This is often accomplished by running the piping for a distance equal to 15 pipe diameters both vertically and horizontally before attaching the piping to the structure.

Additional protection is provided by suspending the piping from the building on resilient hangers or by supporting it from below on resilient mountings. Flexible rubber hose approximately three diameters long should be used on the intake and discharge sides of water pumps. Flexible duct connections should always be used on the intake and discharge of fans, and such flexibility should not be nullified by subsequently covering the duct with rigid insulation on air-conditioning installations.

Effective vibration control for machines is usually quite inexpensive, seldom exceeding 3 percent of the equipment cost. In many cases resilient mountings pay for themselves immediately by eliminating special machinery foundations or the need to bolt equipment to the floor. It is much cheaper to prevent vibration and structural noise transmission by installing mountings when the equipment is installed than it is to go back later and try to correct a faulty installation. Resilient machinery mountings should not be considered a panacea for noise transmission problems. However, they have a definite use in the over-all solution of noise problems, and their intelligent use can produce gratifying results at low cost.

FIG. 16. Spring isolators under this piping prevent transmission of structure-borne vibration and noise. Isolators can also be designed to compensate for thermal expansion. Resilient hangers (Figs. 6 (d) and 7 (d)) are used for suspended piping.

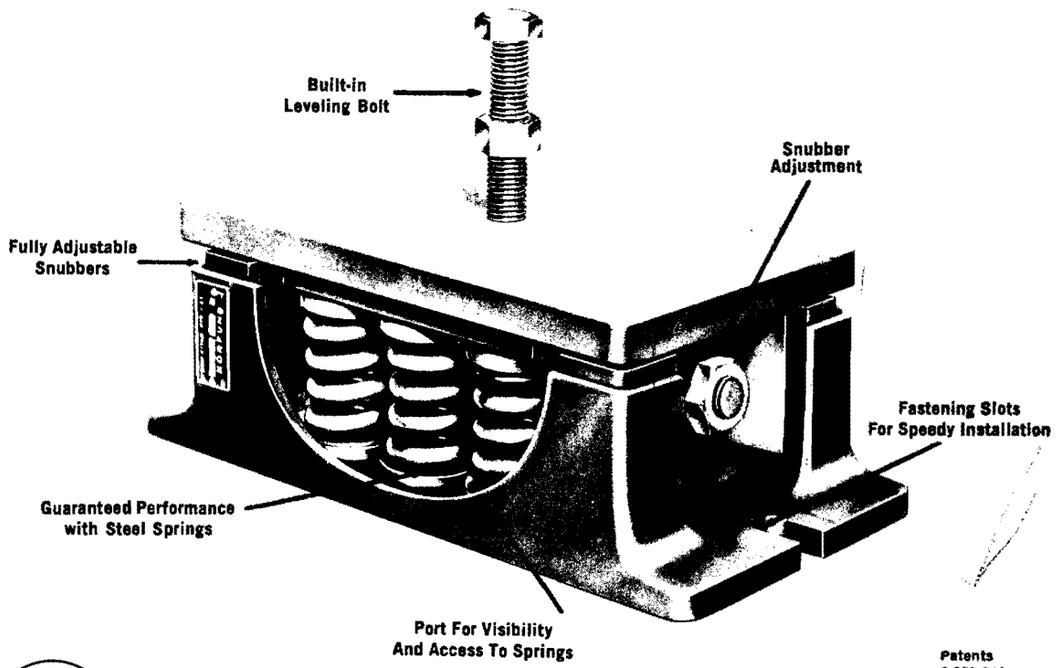


SERIES L

ALL PURPOSE—ALL DIRECTIONAL

FOR EFFICIENT, ECONOMICAL CONTROL OF VIBRATION, SHOCK, & NOISE

- Eliminates bolting equipment to floors
- Eliminates foundations, speeds installation
- Increases production, improves quality
- Allows better plant layout
- Reduces building and machine maintenance
- Improves working conditions
- Stops vibration and noise transmission



Patents
2,359,941
2,466,480

KORFUND

THE KORFUND COMPANY, INC.

Printed in USA

KORFUND

SERIES L VIBRO-ISOLATOR

ALL PURPOSE—ALL DIRECTIONAL

Steel spring Vibro-Isolators provide the most efficient method of isolating vibration, approaching 100% in effectiveness. Strongly recommended for most installations, they are essential on critical jobs, provide greatest over-all economy, permit equipment installations on lighter sub-structures, and are satisfaction guaranteed.

The high efficiency of steel spring Vibro-Isolators is due to the greater deflections which they provide—up to 2" for the Series L Isolators (up to 10" on special Korfund Isolators) compared to about ¼" maximum for other materials. Breakage or loss of resiliency through service in steel spring Isolators is practically non-existent because they are carefully designed so that the endurance limit is never exceeded. And, unlike other materials, steel spring performance can be accurately predetermined, eliminating costly trial and error. Rugged construction plus the properly designed steel springs give Vibro-Isolators long life—usually greater than the machine itself.

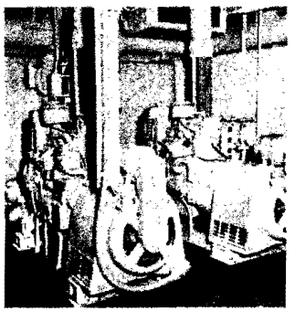
Series L Vibro-Isolators consist of steel or cast housings (see Housing Materials) containing 1 to 12 oil tempered, high carbon or chrome vanadium steel springs. The upper and lower members of the housing are held in their relative position against lateral movement by four resilient inserts. The equipment to be isolated is mounted on the top plate, from which the adjusting bolt transfers the load to the spring compression plate and to the vibration absorbing springs. The adjusting bolt provides a means for leveling the equipment, thereby eliminating the need for leveling jacks, shims, or wedges.

When the load due to the weight of the machine is first applied, the springs are compressed, causing the top plate to move down. The top plate is raised to the proper operating height and the machine leveled by turning the adjusting bolt. Installation and adjustment is as simple as that.

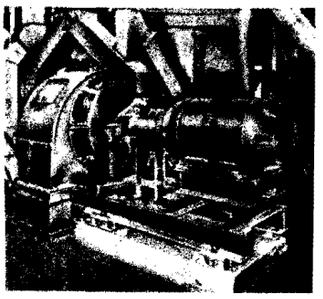
The resilient inserts, which resist horizontal thrust, are made of various materials depending upon the application. These inserts in the LK and LI Isolators can be adjusted to provide varying degrees of damping in all directions by two horizontal bolts, one at each end to control movement. The inserts are large and designed to accomplish damping by means of internal friction thus avoiding the greater wear and greater stiffness (which causes vibration transmission) of other types which utilize surface friction.

Though Isolator springs have a large overload safety factor, Korfund's exclusive design permits changing of springs in the field without removing the Isolators should actual loads be substantially different than those calculated; e.g., if additional piping is added, or if accessory equipment is added to the isolated machine. All operating parts of the Isolator are completely visible.

EFFICIENT, ECONOMICAL VIBRATION CONTROL

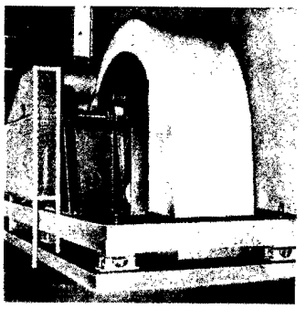


1 Korfund Isolators stopped the transmission of severe vibration from engines. They protect engines from shocks and from twisting of ship's hull.

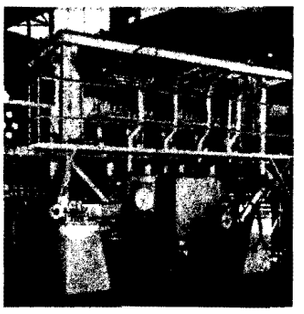


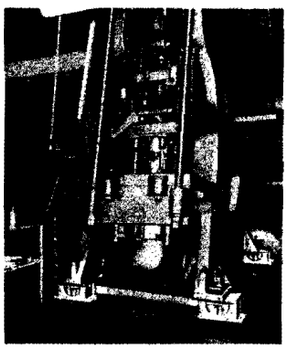
2 Mill on upper floor of steel structure. Korfund Isolators solved serious problem and reduced maintenance.

3 Apartment rooftop installation of fans, compressors, pumps and boilers free valuable basement space for rental garages. Guaranteed vibration-noise control cost less than ½% of the mechanical contract!

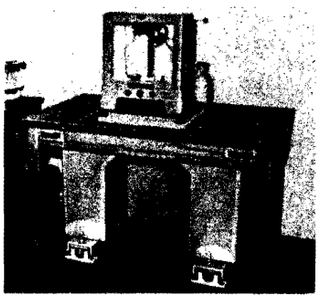


4 Controls and lining of heat treating furnace are protected by Korfund Isolators against shock from nearby 15,000 lb. steam hammers.



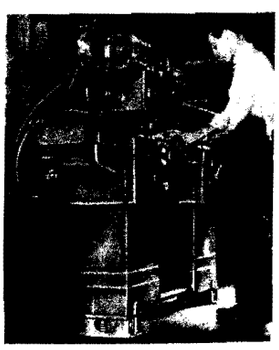


5 This 100 ton punch press installed on an upper floor could not be operated until Korfund Isolators stopped vibration and noise to floors below.

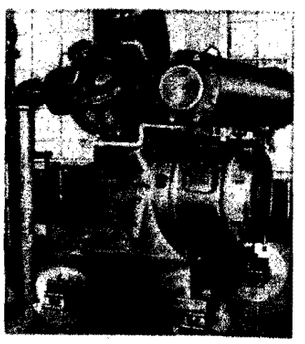


6 Korfund Isolation protects this delicate analytical balance from vibration and shock caused by crushing and shaking equipment in mineral processing plant.

7 Precision grinder accuracy protected against external vibration by Korfund Isolators which also eliminate special foundation and costly lagging down.



8 Large compressor on research laboratory's upper floor. Korfund Isolators stopped vibration transmission to sensitive instruments, reduced noise level.



if driving motors are not mounted
machine and motor be mounted on
tion under which the isolators are p
a common steel base or concrete fou

DIRECT MOUNTING — EX

1) **STANDARD ISOLATORS** — The s
in fig. 1. However, for most machin
some fastening is desired, isolators
embossed synthetic rubber sound pa

DIRECT MOUNTING — IN

2) **ISOLATORS WITH INTERNAL A**
dation holes, isolators can be furnis
Such machines usually require no fa
and cement (see "To Bolt or Not t
machine to isolators.

3) **MACHINES WITH OFF-CENTER**
not in the center of the machine l
adjusted isolators can be furnishe
extra charge; or use fig. 2. Where bo
pockets of insufficient height for t
may be furnished with tapped top pl
from the adjusting bolt; or use fig. 2

NOI

4) **ISOLATORS WITH SYNTHETIC**
where noise and high frequency dist
waffle-embossed synthetic rubber
These ¼" thick Elasto-Grip pads
bolting, but they may be bolted as
special cement (developed strength

HEI

5) **SADDLES** – If increase in heigh
may be supported on angle or char
plates may be used to strengthen
directly to the machine base.

COI

NOTE: Placing internally adjusted
simplest method and the cheapest t
sible for adjustment, consult Korfun

6) **THRU-BOLTS** — With thin concr
with extra long adjusting bolts (extr

7) **STEEL FRAME** — It is often c
channel angle iron frame; flanges p
Brackets (see figure 5) may also b
case frame flanges point inward.

8) **POCKETS** — To keep installatio
in place on floor, and raising with
isolators in pockets recessed in bott

9) **THRU-BEAMS** — The same adv
Isolators to the ends of cast-in bea

MOBI

10) **LIMIT STOPS** — Where large
or internal forces (e.g. dynamos s
equipment, limit stops should be
wind loads. If limit stops cannot be
should be provided, as shown.

THE **KORI**

KORFUND

48-15 Thirty Secon

Over half a century of VI

Represent

Listed under "Korfund"

(1) NO BOLTING TO FLOOR is required with most types of machines. (e.g. grinders, jig borers, boring mills, lathes, small compressors and most punch presses)—just set the Isolators on the floor. This means real savings through: (1) Eliminating drilling of the floor and setting of anchor bolts, and (2) rapid mobility of machines for maximum production line efficiency. Eliminating foundation bolts is possible because Vibro-Isolators absorb the dynamic forces generated by the machine. The result is practically a static weight on the floor instead of the large variations in bearing load which cause "walking" of non-isolated machines.

(2) Maximum fastening calling for the use of foundation bolts is required only for machines with large unbalanced forces (e.g. crushers), large overhanging weights (e.g. some inclinable punch presses), or machines subject to belt pull from separately mounted motors.

(3) Intermediate fastening requirements (e.g. some surface grinders), may be met by cementing the Isolators to the floor by means of ⅛" thick Korfund felt pads—developed bond strength 65 psi. This method also avoids drilling holes in the floor, and the machines can be readily relocated by dissolving the cement with a special solvent. NOTE: The felt pads act only as a cementing intermediary and have little value for sound absorption or vibration isolation; if structurally borne noise transmission is a problem, use Korfund synthetic rubber sound insulation pads under the Isolator (see arrangement 4, page 6).

VARIATIONS AVAILABLE

The Series L Vibro-Isolators are the most versatile vibration control mountings available. They are offered in several standard variations at no extra charge; in addition, special modifications are available at nominal extra charges.

LEVEL ADJUSTMENT: Regular, external adjustment (type LK and LN) for the majority of installations or internal adjustment (type LI and LO) are standard. The types LI and LO have internal adjustment which permits their location anywhere, irrespective of availability or location of bolt holes in the machine base or concrete foundation (see arrangements 2 and 3, page 6). The size J is available with internal adjustment only.

ADJUSTING BOLT: Standard bolt will pass through 2" machine leg. Longer bolts for thicker legs are special.

SNUBBER ADJUSTMENT: Fully adjustable snubbing by means of end nuts is standard for LK and LI Isolators; for size A, adjustment is slightly different from arrangement shown. LN and LO have non-adjustable inserts for alignment purposes, without any snubbing action; they can be converted to LK and LI in the field.

SNUBBER INSERTS: Oil resistant synthetic rubber is standard for LK and LI. Composition cork is standard for LN and LO, and in LK and LI for light loads (in Isolators using the numbers 32, 33, and 34 springs). Special: Rubber impregnated duck for heavy duty service, asbestos for high temperatures.

SPRINGS: Oil tempered high carbon or chrome-vanadium steel is standard. Special: Softer springs for lighter loads, stainless steel or coated springs for corrosion resistance.

HOUSING MATERIALS: Cast semi-steel is standard for all Isolators except size H (malleable casting), and size J (welded steel). All other Isolators are available in malleable castings or welded steel at extra charge.

FASTENING TO FLOOR: Slotted holes for bolts in base plate are standard. Special: Korfund felt pads, or synthetic rubber sound pads, and cement for cementing to floor.,

FASTENING TO MACHINE: Single bolt is standard on types LK, LN, and LM Isolators. Types LI and LO have no provision for fastening, but one tapped hole will be furnished without charge upon request. Special: extra tapped holes in top plate for bolting; felt and cement for cementing (LI and LO only).

SOUND DAMPING: For maximum noise absorption, Korfund waffle-embossed synthetic rubber pads are available at extra charge (see arrangement 4, page 6).

PROTECTIVE COATINGS: Vista Green enamel is standard. Special: zinc chromate primer (salt water corrosion), neoprene coating (chemical corrosion), canvas enclosure (heavy dust or powder accumulations), cadmium plated bolts and nuts.

KEY TO DESIGNATIONS WHEN ORDERING

Isolator Designations

Type	Leveling	Snubbing
LK	External	Adjustable
LI	Internal	Adjustable
LN	External	Non-Adjustable
LO	Internal	Non-Adjustable

Accessory Pad Designations

Type	Top Plate	Bottom Plate	
		Cemented	Bolted
Felt	A	E	G
Rubber	B	F	H

Suffixes shown above follow spring number in designation.

Example LNA-45H = External leveling, non-adjustable snubbing, "A" size housing, #45 spring, rubber pad, and isolation washers for bolted arrangement.

HOW TO SPECIFY SERIES L VIBRO-ISOLATORS

"The isolation mountings shall consist of steel or cast iron top and bottom housings incorporating one or more steel springs and shall be provided with built-in leveling bolts and built-in, resilient chocks to control oscillation and withstand lateral forces in all directions; they shall be Korfund Series L Vibro-Isolators or approved equal, and shall be installed in accordance with the manufacturer's instructions."

CAPA
Data Appli

ISOLATOR		MA IN
HOUSING SIZE	SPRING NUMBER (1)	MAX. STEADY
A	32	1
	33	2
	34	3
	45	3
	46	5
	47	7
	57	1,1
	68	1,3
	25	3
	26	5
	27	7
	28	1,0
	29	1,4
D	32	3
	33	4
	34	6
	45	7
	46	1,0
	47	1,4
	57	2,2
	68	2,6
	25	7
	26	1,0
	27	1,4
	28	2,0
	29	2,8
E	32	6
	33	8
	34	1,2
	45	1,5
	46	2,1
	47	2,9
	57	4,4
	68	5,2
	25	1,5
	26	2,1
	27	2,8
	28	4,1
	29	5,6
F	32	9
	33	1,2
	34	1,8
	45	2,3
	46	3,2
	47	4,3
	57	6,6
	68	7,8
	25	2,3
	26	3,1
	27	4,2
	28	6,2
	29	8,4
G	32	1,3
	33	1,8
	34	2,7
	45	3,4
	46	4,8
	47	6,5
	57	9,9
	68	11,7
	25	3,4
	26	4,7
	27	6,3
	28	9,3
	29	12,6
H	754	7,6
	755	9,5
	756	11,4
	757	13,3
	758	15,3
	759	17,2
J	7512	22,9

(1) First 2 digits in
any, indicate quant
in an Isolator for
#45 and two #46
(2) Ratings listed u
tions (no impact).
applications on pu
(3) Static spring de
(4) Minimum opera
sion shown in refer
(5) These are speci
those possible with
pact applications.
† 7 or 8 springs may

ts (e.g. some inclinable
:o belt pull from sepa-

nts (e.g. some surface
ıe Isolators to the floor
pads—developed bond
ds drilling holes in the
relocated by dissolving
:: The felt pads act only
: little value for sound
tructurally borne noise
synthetic rubber sound
arrangement 4, page 6).

chrome-vanadium steel
lighter loads, stainless
istance.

: is standard for all Iso-
ıg), and size J (welded
: in malleable castings

for bolts in base plate
ds, or synthetic rubber
g to floor.,

t is standard on types
d LO have no provision
l be furnished without
ɔped holes in top plate
ing (LI and LO only).

se absorption, Korfund
; are available at extra

ı enamel is standard.
:er corrosion), neoprene
enclosure (heavy dust
ated bolts and nuts.

PECIFY
)-ISOLATORS

l consist of steel or cast
gs incorporating one or
be provided with built-
resilient chocks to con-
ıd lateral forces in all
orfund Series L Vibro-
and shall be installed
facturer's instructions."

TABLE A
CAPACITY & CHARACTERISTICS
Data Applies to Types LK, LI, LM, LN & LO

ISOLATOR HOUSING SIZE	ISOLATOR SPRING NUMBER (1)	MAX. CAPACITY IN POUNDS (2) STEADY	MAX. CAPACITY IN POUNDS (2) IMPACT	ISOLATOR CONSTANT LBS./INCH (3)	FREE HEIGHT INCHES LK & LN	FREE HEIGHT INCHES LI & LO	MINIMUM WORKING HEIGHT (4)	QUANTITY OF SPRINGS
A	32	150	—	75	4⅞"	5⅜"	3½"	1
	33	210	—	117	4⅞	5⅜		
	34	300	—	200	4⅞	5⅜		
	45	385	290	440	3½	4¼		
	46	540	405	800	3½	4¼		
	47	730	550	1,225	3½	4¼		
	57	1,100	825	2,130	3⅞	4¼		
	68	1,300	1,225	2,850	4¼	4⅝		
	25	385		226	4⅞	5⅜		
	26	525		350	4⅞	5⅜		
	27	700	(5)	560	4⅞	5⅜		
	28	1,040		1,095	5¼	5⅜		
	29	1,400		1,858	5¼	5⅜		
D	32	300	—	150	5⅜"	6"	4"	2
	33	420	—	234	5⅜	6		
	34	600	—	400	5⅜	6		
	45	770	580	880	4	4⅝		
	46	1,080	810	1,600	4	4⅝		
	47	1,460	1,100	2,450	4	4⅝		
	57	2,200	1,650	4,260	4⅛	4¾		
	68	2,600	2,450	5,300	4½	5⅛		
	25	770		452	5⅜	6		
	26	1,050		700	5⅜	6		
	27	1,400	(5)	1,120	5⅜	6		
	28	2,080		2,190	5½	6⅛		
	29	2,800		3,716	5½	6⅛		
E	32	600	—	300	5⅛"	6⅛"	4⅛"	4
	33	840	—	468	5⅛	6⅛		
	34	1,200	—	800	5⅛	6⅛		
	45	1,540	1,160	1,760	4¼	4¾		
	46	2,160	1,620	3,200	4¼	4¾		
	47	2,920	2,200	4,900	4¼	4¾		
	57	4,400	3,300	8,520	4¼	4⅞		
	68	5,200	4,900	10,600	4⅜	5¼		
	25	1,540		904	5⅛	6⅛		
	26	2,100		1,400	5⅛	6⅛		
	27	2,800	(5)	2,240	5⅛	6⅛		
	28	4,160		4,380	5⅛	6¼		
	29	5,600		7,432	5⅛	6¼		
F	32	900	—	450	5¾"	6½"	4¼"	6
	33	1,260	—	702	5¾	6½		
	34	1,800	—	1,200	5¾	6½		
	45	2,310	1,740	2,640	4⅜	5⅛		
	46	3,240	2,430	4,800	4⅜	5⅛		
	47	4,380	3,300	7,350	4⅜	5⅛		
	57	6,600	4,950	12,780	4½	5¼		
	68	7,800	7,350	15,900	4⅞	5⅝		
	25	2,310		1,356	5¾	6½		
	26	3,150		2,100	5¾	6½		
	27	4,200	(5)	3,360	5¾	6½		
	28	6,240		6,570	5⅞	6⅝		
	29	8,400		11,150	5⅞	6⅝		
G	32	1,350	—	675	5⅞"	6½"	4¼"	9†
	33	1,890	—	1,053	5⅞	6½		
	34	2,700	—	1,800	5⅞	6½		
	45	3,460	2,610	3,960	4½	5⅛		
	46	4,850	3,645	7,200	4½	5⅛		
	47	6,560	4,950	11,025	4½	5⅛		
	57	9,900	7,425	19,160	4⅝	5¼		
	68	11,700	11,025	23,850	5	5⅝		
	25	3,465		2,034	5⅞	6½		
	26	4,725		3,150	5⅞	6½		
	27	6,300	(5)	5,040	5⅞	6½		
	28	9,360		9,860	6	6⅝		
	29	12,600		16,720	6	6⅝		
H	754	7,640	5,720	11,540	7"	8"	6½"	4
	755	9,540	7,150	14,430	7	8		5
	756	11,450	8,580	17,320	7	8		6
	757	13,370	10,000	20,200	7	8		7
	758	15,300	11,460	23,090	7	8		8
	759	17,200	12,900	25,970	7	8		9
J	7512	22,900	17,160	34,640	—	8¼"	7⅝"	12

(1) First 2 digits indicate spring designation number. Additional digits, if any, indicate quantity of springs used. Different springs may be combined in an Isolator for special conditions; for example, LKE-452-462 has two #45 and two #46 springs.

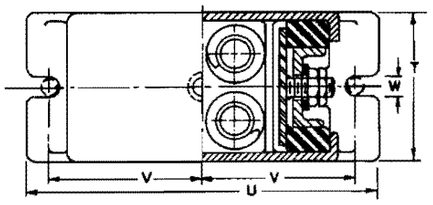
(2) Ratings listed under "STEADY" are maxima for steady running applications (no impact). Ratings listed under "IMPACT" are maxima for impact applications on punch presses, hammers, and pulverizers.

(3) Static spring deflection in inches = load ÷ Isolator constant.

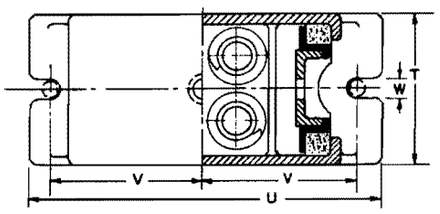
(4) Minimum operating height = free height − spring deflection, or dimension shown in referenced column, whichever is greater.

(5) These are special alloy steel springs providing greater deflections than those possible with standard springs. They are normally not used for impact applications.

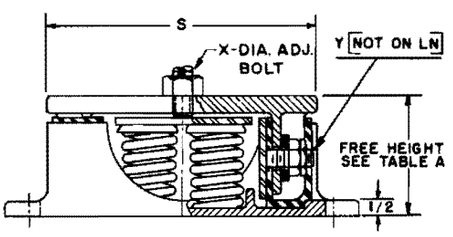
† *7 or 8 springs may be used for special job conditions*



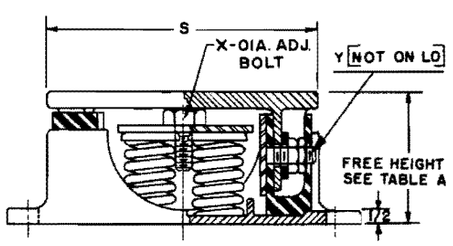
TYPICAL PLAN VIEW OF THE TYPES LK & LI ISOLATOR, SIZE E SHOWN



TYPICAL PLAN VIEW OF THE TYPES LN & LO ISOLATOR, SIZE E SHOWN



TYPICAL ELEVATION VIEW OF THE TYPES LK & LN ISOLATOR, SIZE E SHOWN



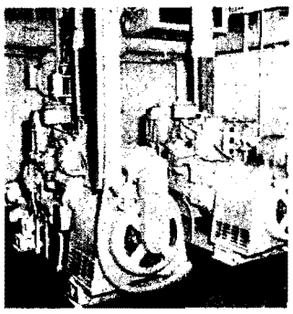
TYPICAL ELEVATION VIEW OF THE TYPES LI & LO ISOLATOR, SIZE E SHOWN

TABLE B
DIMENSIONS & SHIPPING WEIGHTS

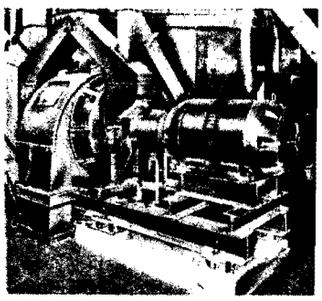
Dim. In Inches	ISOLATOR HOUSING SIZE A	B	E	F	G	H	J
S	4	6⅞	9⅛	6⅛	11½	11½	13¾
T	2½	5	5	7	7	7	7
U	6⅞	9½	11¾	11¾	14	14	16¼
V	2¾	4	5⅛	5⅛	6¼	6¼	7⅜
W	⅝	⅝	1⅛	1⅛	1⅜	1⅜	1⅜
X	½	⅝	⅝	¾	¾	1	1*
Y	⅛	⅛	⅛	¾	¾	¾	¾
Shipping Wt. lbs.	7	20	25	35	45	80	120

**Type LI/J and LO/J furnished with two internal adjustment bolts.*

EFFICIENT, ECONOMICAL VIBRATION CONTROL

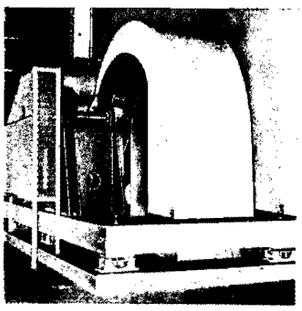


1 Korfund Isolators stopped the transmission of severe vibration from engines. They protect engines from shocks and from twisting of ship's hull.

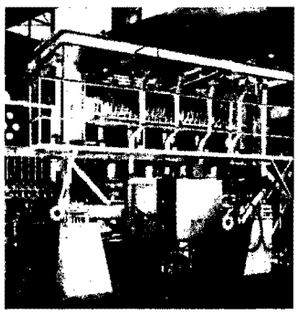


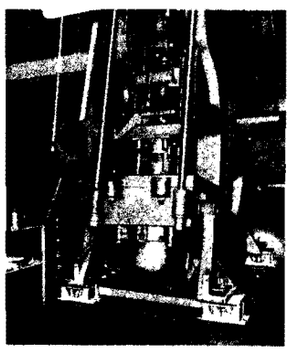
2 Mill on upper floor of steel structure. Korfund Isolators solved serious problem and reduced maintenance.

3 Apartment rooftop installation of fans, compressors, pumps and boilers free valuable basement space for rental garages. Guaranteed vibration-noise control cost less than ½% of the mechanical contract!

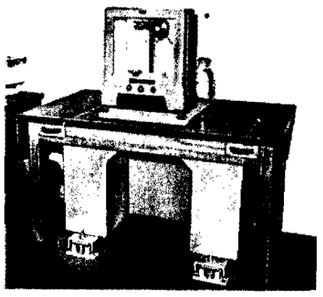


4 Controls and lining of heat treating furnace are protected by Korfund Isolators against shock from nearby 15,000 lb. steam hammers.



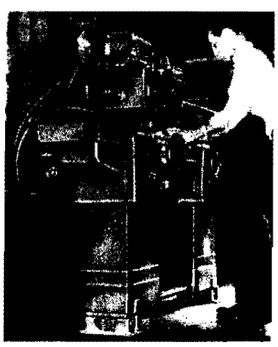


5 This 100 ton punch press installed on an upper floor could not be operated until Korfund Isolators stopped vibration and noise to floors below.

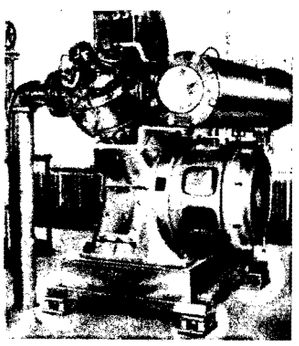


6 Korfund Isolation protects this delicate analytical balance from vibration and shock caused by crushing and shaking equipment in mineral processing plant.

7 Precision grinder accuracy protected against external vibration by Korfund Isolators which also eliminate special foundation and costly lagging down.



8 Large compressor on research laboratory's upper floor. Korfund Isolators stopped vibration transmission to sensitive instruments, reduced noise level.



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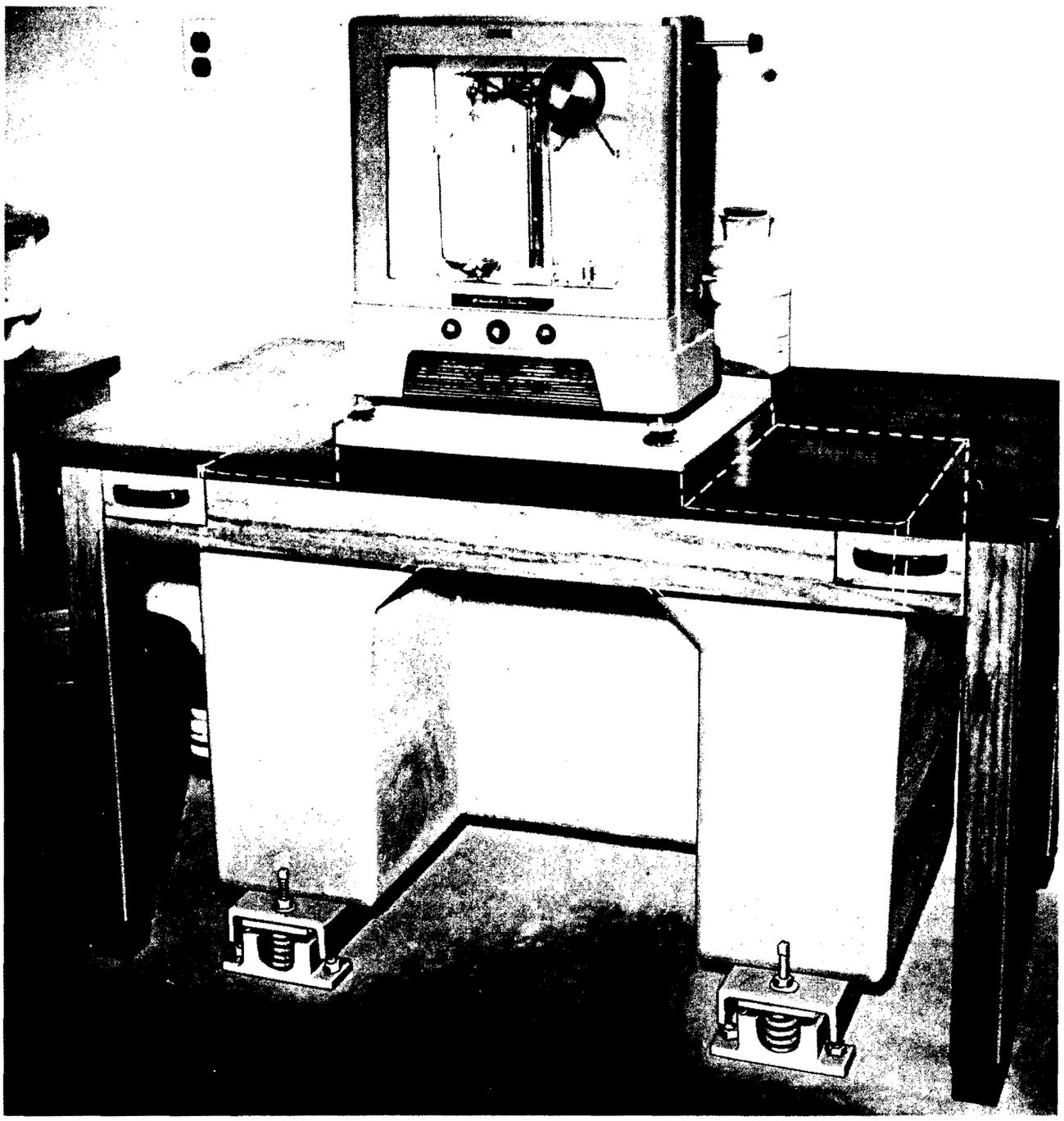


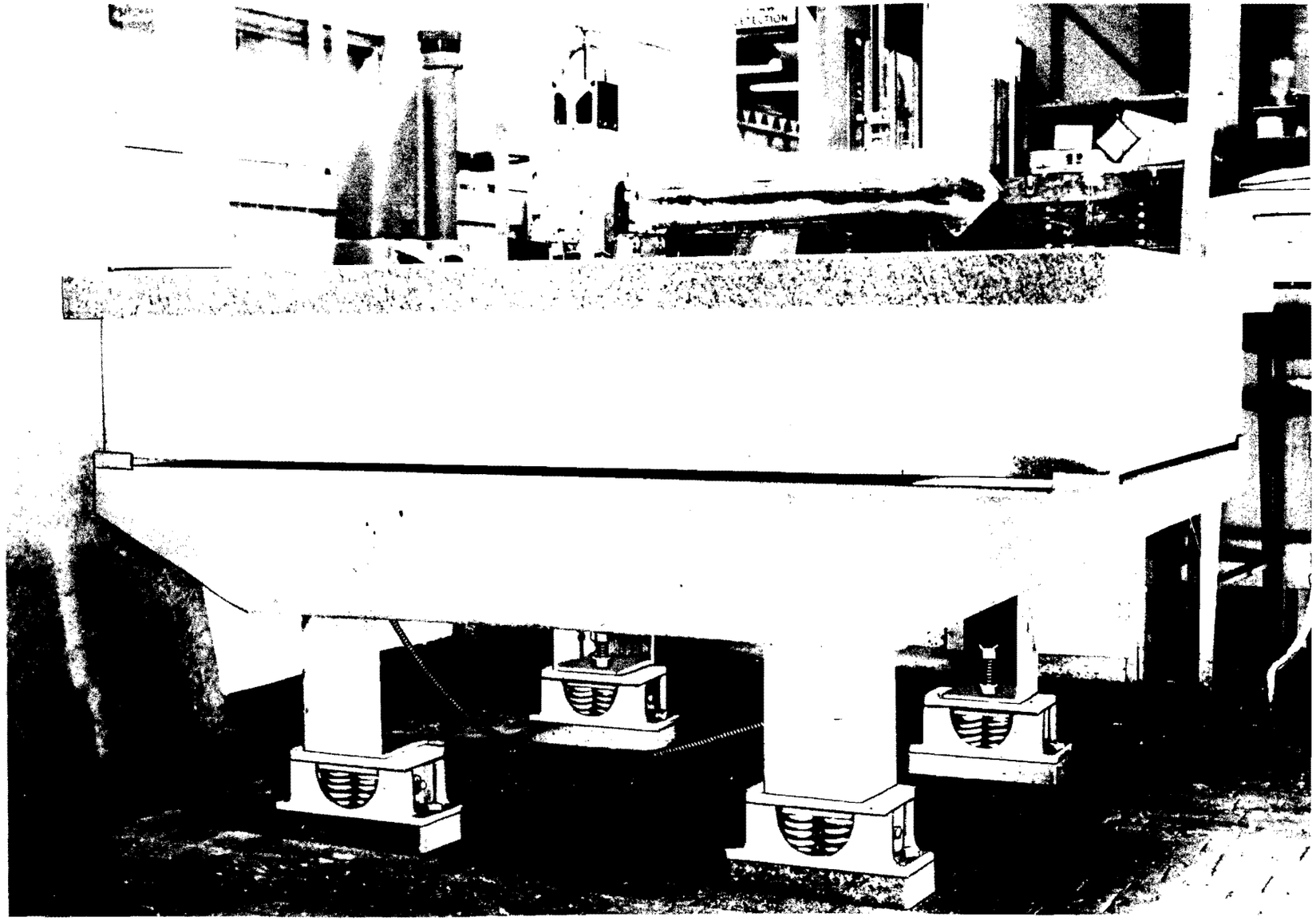
ANALYTICAL BALANCE
SOUTHWEST POTASH CORPORATION — CARLSBAD, NEW MEXICO

KORFUND VIBRATION CONTROL

KORFUND STEEL SPRING VIBRO-ISOLATORS PROTECT THIS DELICATE ANALYTICAL BALANCE FROM VIBRATION AND DISTURBANCES CAUSED BY CRUSHING AND SHAKING EQUIPMENT IN THIS LARGE PROCESSING PLANT. PHANTOM VIEW SHOWS HOW HIGHEST DEGREE OF ACCURACY IS MAINTAINED BY ISOLATING THE CONCRETE BLOCK FROM THE TABLE— OPERATOR MAY WORK AT TABLE WITHOUT DISTURBING THE BALANCE.

PHOTO #577

THE KORFUND COMPANY INC.
48-15 THIRTY SECOND PLACE, LONG ISLAND CITY 1, N. Y.

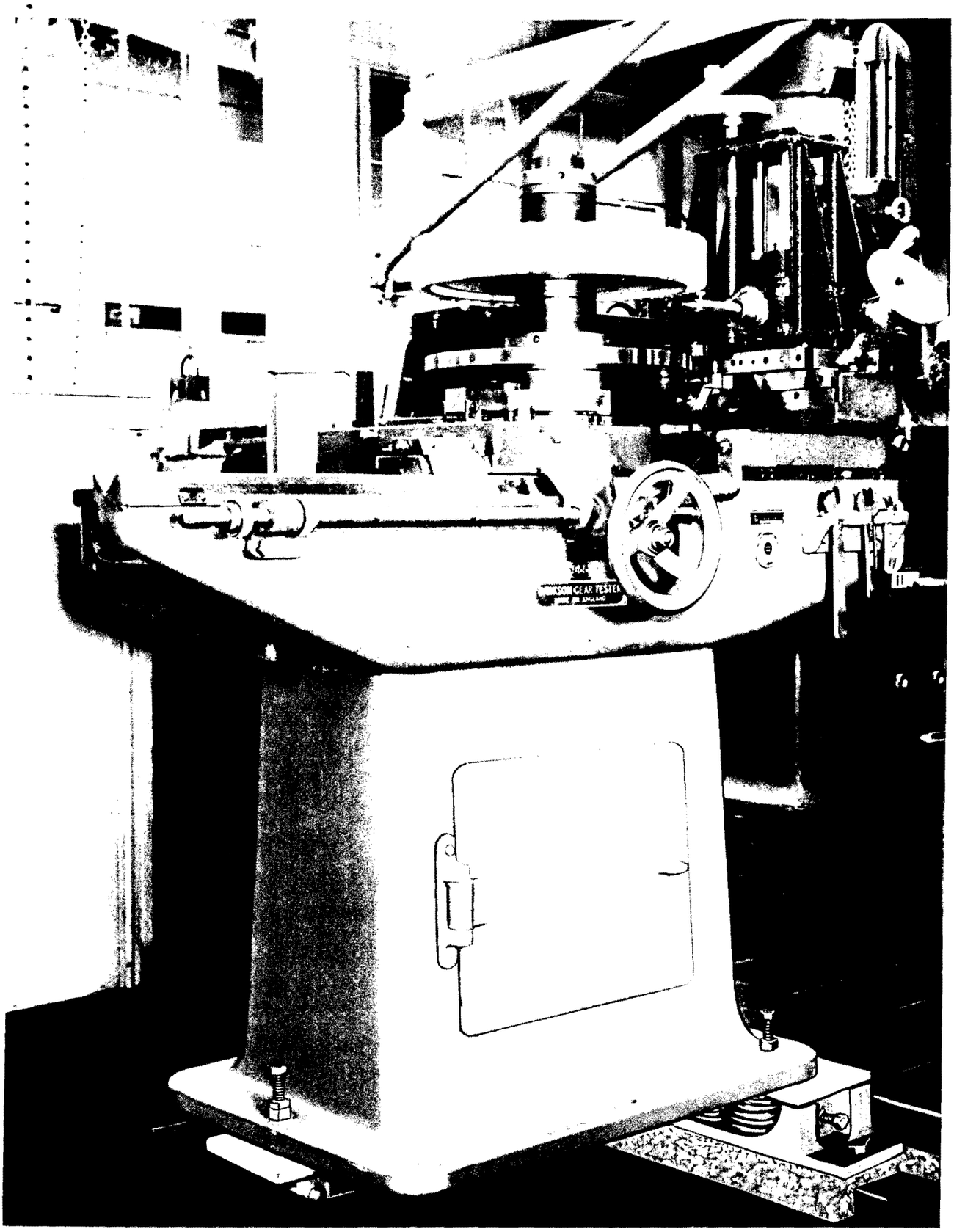


5,000# SURFACE PLATE — CATERPILLAR TRACTOR CO., PEORIA, ILL.

Severe external vibration from trucks and trains made accurate work on this surface plate impossible until it was mounted directly on Korfund Vibro-Isolators which solved the problem.

28948

Photo #490

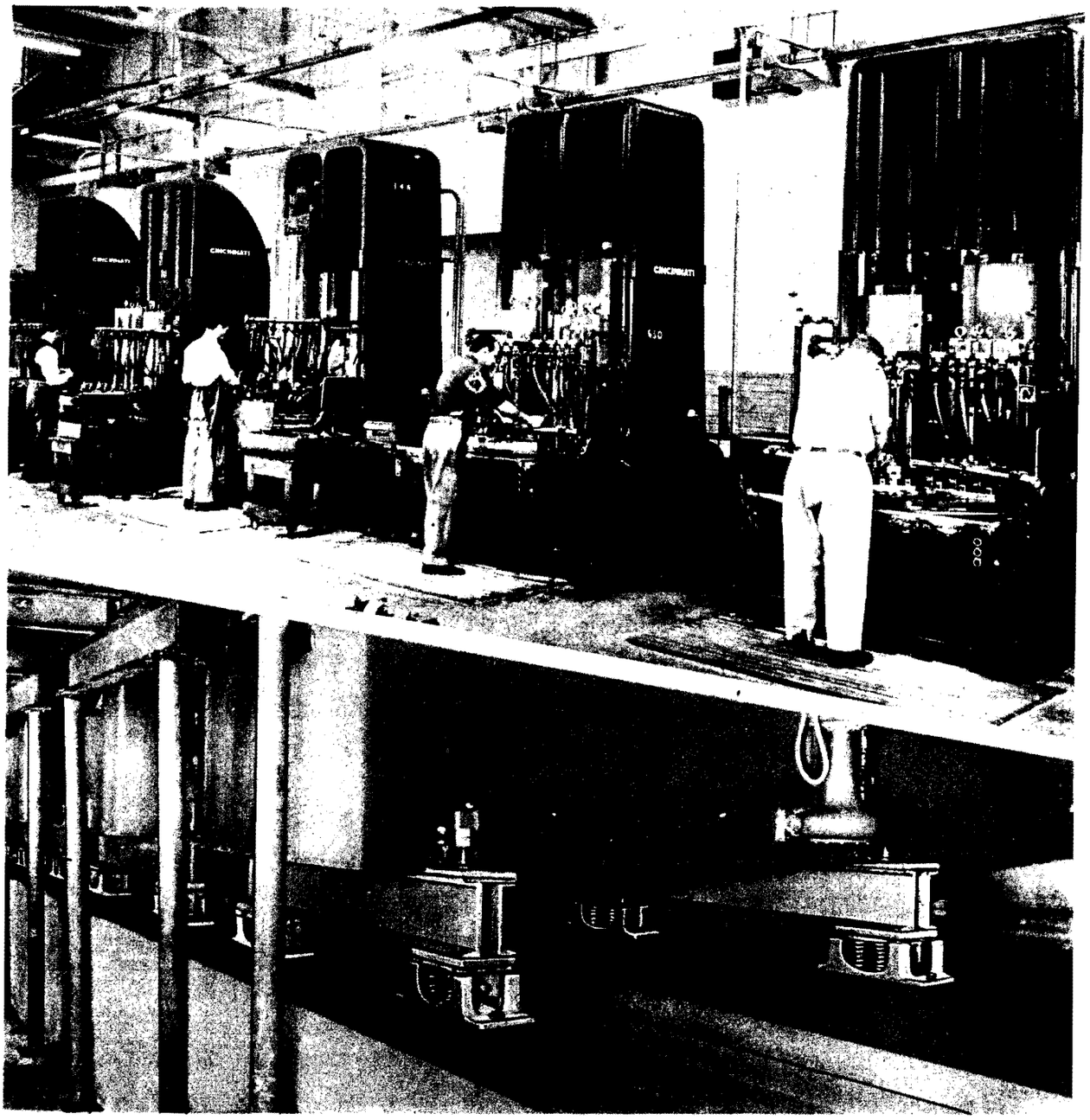


PARKINSON GEAR CHECKER — CATERPILLAR TRACTOR CO., PEORIA, ILL.

Severe external vibration from trucks and trains made accurate work impossible on this checker until it was mounted directly on Korfund Vibro-Isolators. Isolators set in pockets made by removing wood block flooring.

34882

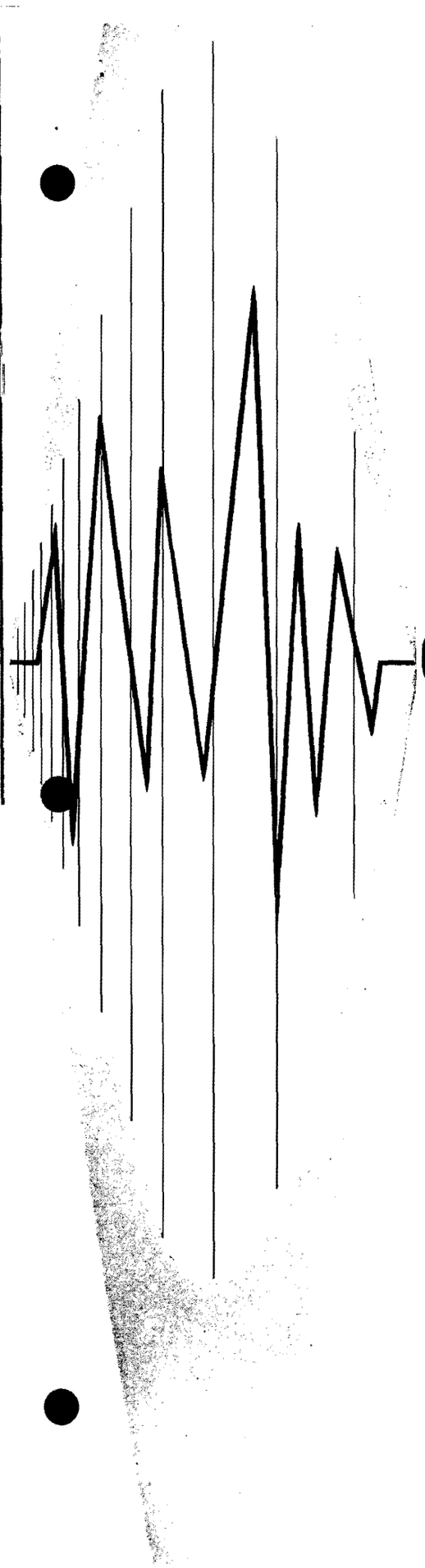
Photo #489



FIVE CINCINNATI BROACHES — HIGH STANDARD MFG. CO., HAMDEN, CONN.

Mounting these five 29,000# Cincinnati #10-66 Duplex Vertical Broaches on Korfund Spring Isolators prevent vibration transmission from one broach into another and into adjacent precision grinders. Lower photo shows Isolators under the floor.

30861 **Photo #477**



VIBRATION, SHOCK, AND NOISE CONTROL AND MEASUREMENT

steel spring, rubber, and cork isolation,

flexible hose, acoustical materials, instruments

KORFUND

Experiments cost you money. There is a right type—and many wrong types—of vibration, shock, and noise isolation product for each job. Korfund picks the right type for your job from Steel Springs, Cork, Rubber, Flexible Connectors, and Acoustical Baffles, Panels or Rooms.

Our half century of experience eliminates trial and error, yet the Korfund System costs no more than less effective, less permanent methods.

advantages of Korfund isolation equipment

Prevent vibration transmission, reduce dynamic loads
Permit machinery installation anywhere
Eliminate special foundations or structural reinforcement
Speed equipment installation, relocation, and production-line change-over
Lengthen building & machine life, reduce maintenance costs
Increase production, machine speed, and quality

engineering service

Korfund engineers, with a half century of experience in solving vibration, shock, and noise control problems and in machinery foundation design, will serve you without charge or obligation. Call on 56 Korfund engineering representatives in the U.S. and Canada listed under "Korfund" in Thomas' Register and your local telephone directory or the home office.

plant surveys

Korfund is fully equipped to conduct plant surveys to determine the best method for controlling vibration, shock, and noise to save time and money, and prevent future permanent damage to both machinery and structure.

 Printed in U.S.A. BULLETIN K4G

A.I.A. File No. 39D

WHY VIBRATION AND SHOCK

Why isolate vibration and shock? Vibration, shock, and noise transmitted from rotating or reciprocating machinery are more than just annoying — they are often destructive to buildings, equipment, and employee efficiency. The Korfund System of Vibration Control serves one or more of these purposes:

1 **Positive Isolation** — prevents transmission of vibration and shock from impact, rotating or reciprocating equipment into precision machines, delicate equipment, and building, or to personnel.

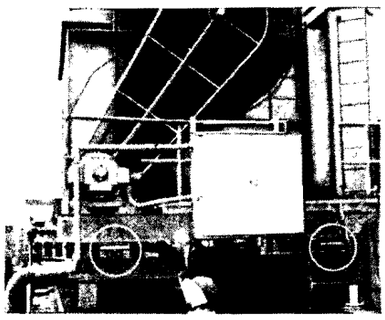
Experience and tests have shown that excessive vibration and the noise which accompanies it have a decided influence on the nervous system, and contribute materially to mental and physical fatigue. Such fatigue is detrimental to the health, leads to accidents, and reduces the efficiency of workers. The cost of vibration and noise control will generally be recovered in a short time by an actual increase in personnel efficiency.

2 **Negative Isolation** — prevents transmission of external vibration and shock from other machinery, trucks, trains, etc. into machine tools or other precision equipment.

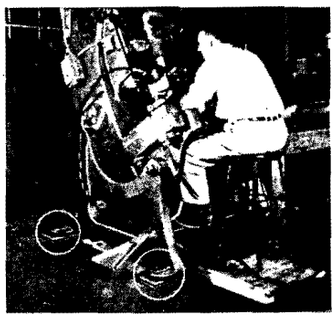
The same Isolators may perform more than one function at the same time under the same machine. For example they will stop vibration transmission from a grinder taking rough cuts, then protect it against external vibrations when it takes final precision cuts.

3 **Alignment** — Isolators compensate for uneven floors and help prevent distortion and mis-alignment of machines installed on weak floors by supporting the machines when trucks or other loads deflect the sub-structure.

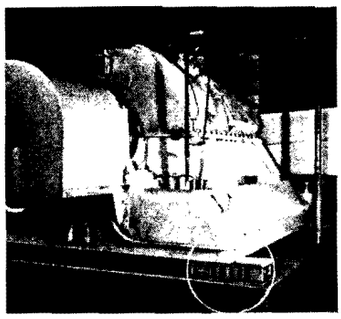
typical applications



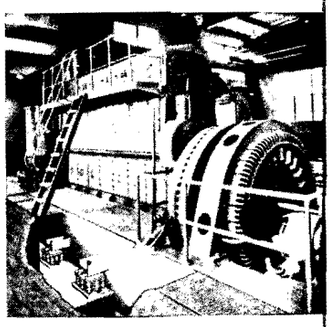
Rubber mountings had been misapplied under this slow speed fan on a hotel roof. Transmitted vibration rendered 20 rooms unrentable. Installation of Korfund spring isolators—costing $332.00—completely solved the problem, permitting rental of the suites.



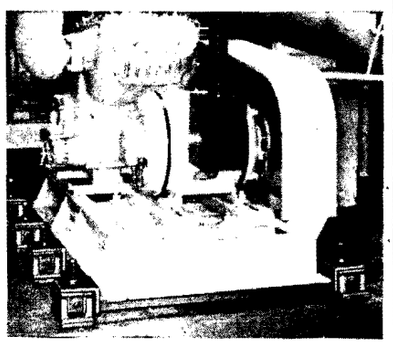
Korfund rubber and cork Elasto-Rib pads under this press speed installation, eliminate bolting to floor, and reduce vibration and noise—cost $16.00. Presses over 50 tons capacity and upper floor installations generally require steel spring isolators.



Korfund isolation for this centrifuge and other processing equipment saved the cost of floor reinforcement, stopped cracking of floors, and permitted location on upper floors without special foundations for economical gravity flow of materials.

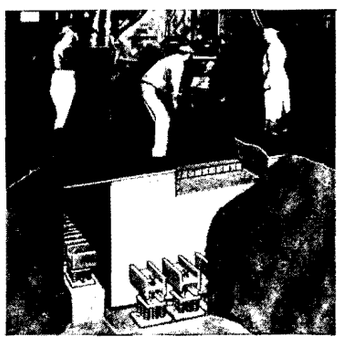


Korfund isolators permitted installation of six huge 1425 h.p. four cycle supercharged Diesel engine-generators on poor soil without vibration transmission.



Korfund isolators—cost $376—replaced improperly engineered rubber rails—cost $160—stopped serious vibrations transmitted thru five floors (brackets maintained original piping heights).

Korfund rubber and cork Elasto-Rib Dampers under this machine tool speed installation, eliminate bolting, provide built-in leveling, and reduce vibration transmission. Cost $24.00.



Korfund vibration control solved the problem after $25,000 forging hammer installed on rubber mounted foundation was abandoned because of shock transmitted to neighboring structures.

Korfund vibration control protects sensitive equipment such as the electron microscope against external vibration, and insures the necessary accuracy of performance.

selection chart

Isolation recommendations are listed opposite each machine by numbers which correspond with numbers assigned to Korfund products described on pages 4 thru 8. Where more than one product is listed, selection is governed by job conditions. Isolation recommended for highest efficiency offers in most cases advantages of easier installation, built-in leveling devices, and longer life in addition to maximum vibration isolation and noise reduction. Consequently, the over-all cost is often no higher than for alternate recommendations. Selections are based upon normal installation conditions, and are subject to variations in event of unusual job circumstances.

type of vibration control

The type, size, speed, service conditions, and location of equipment determine the type of isolation required. Properties of the various isolation media are discussed at top of pages 4 and 6. The table below indicates relative effectiveness of steel springs, rubber, and cork in the various equipment speed ranges.

comparison table

range	rpm	springs	rubber or elasto-rib	cork
low	up to 1200	required	not recommended except for shock*	unsuitable except for shock*
medium	1200-1800	excellent	fair	not recommended
high	over 1800	excellent for critical jobs	good	fair to good

*For non-critical installations only; otherwise, springs are recommended.

typical specifications

1. **Machines Mounted Directly on Isolation Material:** "To prevent vibration and shock transmission, the (machine) shall be resiliently mounted directly on Korfund (type of Isolator). Isolator sizes to be determined by manufacturer and units to be installed in accordance with manufacturers instructions."
2. **Machine and Driving Unit Mounted on Isolated Steel Base:** "To prevent vibration and shock transmission, the (machine and driving unit) shall be mounted on an integral steel base which shall be resiliently mounted on Korfund (type of Isolator). Isolator sizes to be determined by manufacturer and units to be installed in accordance with the manufacturer's instructions."
3. **Machines Mounted on Isolated Concrete Foundation:** "To prevent vibration and shock transmission, the (machine) shall be mounted on a concrete foundation which is supported on Korfund (type of Isolation). Isolation sizes to be determined by manufacturer and material to be installed in accordance with manufacturer's instructions."
4. **Fans and Motors:** "Fans and motors shall be mounted on structural steel bases having provision for bolting the equipment, and motor bases shall have built-in adjustable slide rails for belt tightening; the bases shall be Korfund Integral Bases and the isolating medium shall be rubber.

(Note: For high pressure fans and other types in critical locations, use specifications #2 or 3, with type LK or UP Isolators.) Complete air conditioning isolation specifications given in free Bulletin F2C.

Machine	Isolation Recommended For Highest Efficiency		Alternate Recommendation Satisfactory For Less Critical Jobs	
	No Concrete Foundation Required	Concrete Foundation Required	No Concrete Foundation Required	Concrete Foundation Required
Air Conditioners	1, 5	—	7, 10	—
Boring Machines	1	2	6, 7	8, 9
Brakes	1	—	6, 7	—
Broaches	1	—	6, 7	8, 9
Business Machines	1, 7	—	7	—
Centrifuges	1, 3	—	6, 7	—
Clickers	1	—	7	—
Coal Pulverizers (Large)	—	2	—	8, 9
Compressors:				
Vert. V, W, Radial over 450 RPM	1	—	6, 7	—
under 450 RPM	—	4	—	8, 9
Horizontal	—	2, 4	—	8, 9
Centrifugal	1, 2	1, 2	6, 7	8, 9
Cooling Towers	1	—	6, 7	—
Crushers, rock, etc.	2, 3	—	6, †	—
Dinkers	1	—	7	—
Dynamometers	1	1, 2, 4	6, 7	8, 9
Engines:				
High Speed Stationary	1	—	7	8, 9
Marine	3	—	6, 7	—
Low Speed	—	2, 4	—	8, 9
Evaporative Condensers	1, 5	—	7, 10	—
Fans:				
Centrifugal	12	12	13	6, 7, 8
Utility	1, 5	—	7, 10	—
Furnaces	1, 2	—	6, 7	—
Gear Cutters	1	—	6, 7	—
Generating Sets	SEE ENGINES ABOVE			
Grinders:				
Roll	—	2	—	8, 9
Surface, Large	—	1, 2	—	8, 9
All Others	1	—	6, 7	—
Hammers	1	2	6, 7	8, 9
Hammermills	1, 3	—	6, 7	—
Hoggers	1	—	6, 7	—
Instruments	1, 5	1, 2, 4	6, 7, 10	—
Jig Borers	1	—	7	—
Jolt Molders	—	1, 2	6, 7	8, 9
Laundry Extractors	—	1	—	8, 9
Lathes	1	1, 2	6, 7	8, 9
Milling Machines	1	—	7	—
Motor Generator Sets	1	2, 4	6, 7	8, 9
Paper Cutters	1	—	6, 7	—
Pebble Mills	1	—	6, 7	—
Pipe Suppprts	1, 5	—	7, 10	—
Presses:				
Hydraulic	1, 2	2	6, 7	8, 9
Newspaper	—	8, 9	†	—
Printing	6, 7, 8, 9	—	—	—
Punch	1, 2	—	6, 7	—
Pumps	SEE COMPRESSORS ABOVE			
Shapers.	6, 7	—	—	—
Shears	1	2	6, 7	—
Steam Generators	1	—	6, 7	—
Textile Machinery	6, 7	—	—	—
Transformers	1, 5	—	6, 7, 10	—
Turbines	6, 7	8, 9	—	—
Vibrating Screens	1, 3, 4	1, 2, 4	6, 7	—
Vibrating Test Machines	—	1	—	6, 8, 9

† Special Heavy Duty Pads for very high loadings—write for information

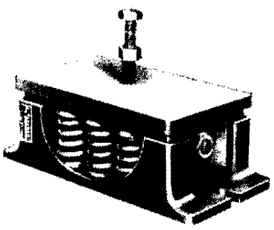
STEEL SPRING

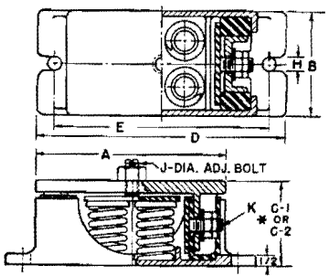
Steel spring Vibro-Isolators provide the most efficient method of isolating vibration, approaching 100% effectiveness. Strongly recommended for most installations, they are essential on critical jobs, provide greatest overall economy, permit installations on lighter sub-structures, and are fully guaranteed.

The high efficiency of steel spring Vibro-Isolators is due to the greater deflections which they provide—see "Theory of Vibration Control," available free from The Korfund Company. Standard steel spring isolators give up to 2" of deflection compared to about ¼" maximum for other materials, while special steel spring isolators can give 10" or more of deflection. Unlike other materials, their performance can be accurately predetermined, eliminating costly trial and error. Housings of rugged steel and malleable construction plus properly designed steel springs gives long life, usually greater than the machine itself. Isolators are unaffected by water, oil, most chemicals, or by temperature extremes.

Isolator adjusting bolts serve as leveling jacks, eliminate shims, speed equipment installation. Adjustable snubbers to control movement are built-in or are available separately.

① series L Vibro-Isolator with built-in leveling device





DIM.	ISOLATOR SIZE *						
	LKA	LKD	LKE	LKF	LKG	LKH	LIJ †
A	4	6⅞	9⅛	9⅛	11½	11½	13¾
B	2½	5	5	7	7	7	7
C1	3½	4	4⅛	4¼	4¼	6¾	—
C2	4⅞	5¼	5⅝	5⅝	5¾	8	8
D	6⅞	9½	11¾	11¾	14	14	16¼
E	5½	8	10¼	10¼	12½	12½	14¾
H	9/16	9/16	11/16	11/16	13/16	13/16	13/16
J ♦	½	⅝	⅝	¾	¾	1	—
K	5/16	⅝	⅝	¾	¾	¾	¾

MAXIMUM LOAD CAPACITY §							
LBS.	1,300	2,600	5,200	7,800	11,700	17,200	22,900

* Average working height, subject to variation with load and springs used in isolators. Use dimension C1 for Types LK, and LN; C2 for LI and LO. All other dimensions same for all series L isolators.

♦ Standard adjusting bolt length accommodates 2" maximum thickness machine base.

† LIJ furnished only with internal adjustment, but has 1"–8 thread hole topped in top plate.

§ These are maximum for steady running conditions such as compressors, engines, etc. For impact conditions, such as hammermills and punch presses, reduce by about 25%.

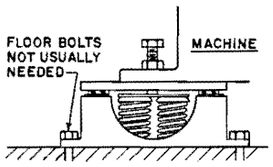
description

The series L Vibro-Isolator consists of a semi-steel cast housing, (size H is malleable casting, size J is welded steel) incorporating oil tempered carbon and alloy steel springs as the isolating medium. Quantity and stiffness of springs are varied to give proper load carrying capacity and dynamic characteristics.

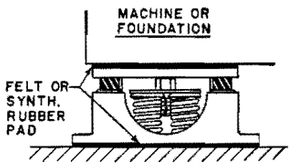
The types LK and LN have a bolt which fastens the equipment to the isolator top plate and bears on a spring compression plate, transferring the load to the vibration absorbing springs; this bolt also provides built-in leveling adjustment. Additional holes may be tapped into the top plate. The types LI and LO have internal adjusting and leveling bolt (fig. b) for machines without bolt holes. The upper and lower parts of the housing are aligned by resilient chocks which take up any horizontal thrust, and which on the types LK and LI can be adjusted for varying degrees of dampening to limit oscillation under both vibration and impact.

typical installation arrangements

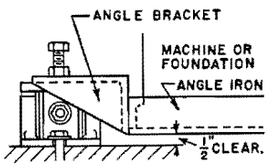
If driving motors are not mounted on the machine, it is usually desirable that both machine and motor be mounted on a common structural steel base or concrete foundation under which the Isolators are placed. Direct coupled machines should always have a common steel base or concrete foundation.



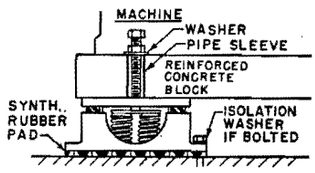
a. direct mounting — external adjusting bolt: The standard method of installing isolators is shown above. Usually it is not necessary to fasten isolators to floor. If fastening is required they can be bolted or cemented to floor. For maximum noise reduction, sound pads may be used under mounts.



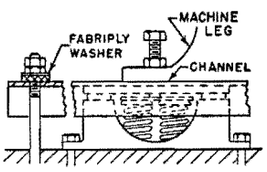
b. direct mounting — internal adjusting bolt: Cementing is accomplished to machine base and floor by means of a thin Korfund felt pad and special cement, (65 #/sq. in. bond strength). Rubber sound pads can be substituted for felt for maximum noise reduction.



c. minimum height installation: If increase in height of the mounted machine is objectionable, isolators can be set under brackets which may be welded or bolted directly to the machine or to saddles, on which the machine may be mounted.

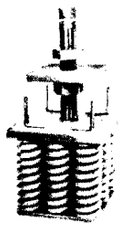


d. indirect mounting with concrete blocks: Concrete blocks may be mounted as shown on isolators, or channels may be cast into the block running thru the concrete and the isolators attached to the ends. Type LI and LO isolators can be used directly under the foundation.



e. mobile installations: Installations where large external forces may overturn the isolated equipment (e.g., marine or mobile, or outdoor subject to wind loads), or large internal forces (e.g., dynamos subjected to short circuits) require limit stops. Channel irons are used if base has no extra holes.

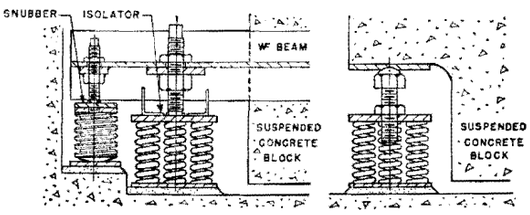
(2) types UN & UV Vibro-Isolators

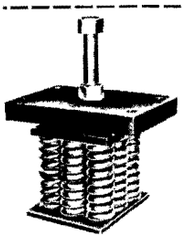


type UN

Load Range: 3,000# to 35,000#. Heavy duty isolator most frequently used to support machines on deep concrete foundations. The structural members cast thru foundation are supported on top of the isolator. Have built-in leveling device. Separate snubbing and damping control available where required. Drawings show typical installation arrangements.

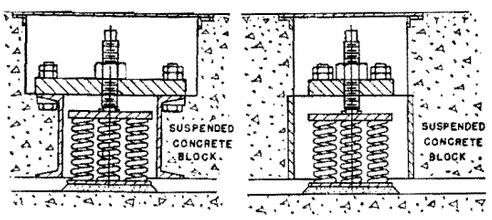
Drawing at left shows block suspended on isolator and separate mechanical snubber by means of steel beam cast thru foundation. Second drawing shows method of eliminating the steel beams.



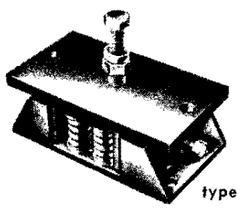


type UV

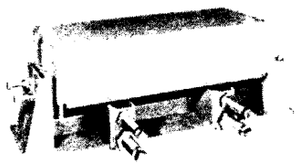
Load Range: 3,000# to 35,000#. This is similar to the Type UN in design and application, but is most frequently used to support machinery on shallow concrete foundations or structural steel chassis. It is located between the structural members, rather than under them, resulting in easier adaptability to chassis and shallow blocks. Drawings show front and side views of a typical arrangement.



(3) series S Vibro-Isolators



type SK



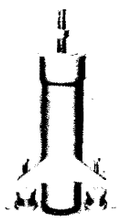
type SW

Load Range: 60# to 200,000#. For heavy duty marine and stationary installations demanding extreme horizontal thrust capacity; also, for punch presses weighing 60,000# and up. Available with leveling bolt on top (type SK), on side (type SW), or inside (type SI). Exceptionally rugged welded steel construction.

These heavy capacity isolators are especially designed to meet the requirements of each job. Even larger load carrying capacities and design modifications are available to meet your specifications and needs.

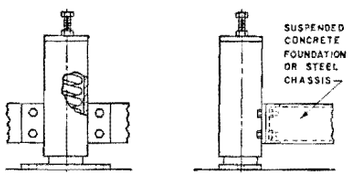
(4) types UP and US Vibro-Isolators

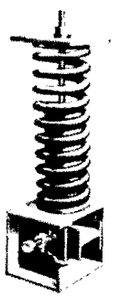
Load Range: 50# to 40,000#. These are low frequency isolators with static deflections up to 10", and are individually designed for each application. They have a built-in leveling device, and built-in or separate snubber controls. Drawings show typical installation arrangements.



type UP

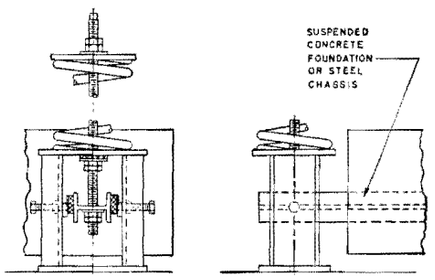
A rugged steel pipe housing in which is incorporated a steel spring designed for the application. The machine to be isolated is carried on either a structural steel base or on a concrete foundation to which the isolators are attached. Relatively long springs permit large deflections for effective isolation of slow speeds.





type US

This is a suspension type vibration isolator that has been specifically designed to mount equipment generating large horizontal forces or couples. It has a unique pendulum suspension system. The bolts on the sides are a part of a snubber system.



(5) series V Vibro-Hangers

type VB

type VH

Load Range: 20# to 3,800#. For suspended equipment such as air conditioning machines, acoustical ceilings, and overhead piping. Various arrangements of springs within the housing permit increasing deflections and capacities. Type VB offers greatest ease of installation since only one bolt is needed to fasten the hanger. Type VH, with open construction, is used when straddling beam webs. Type VR (not shown) consists of a spring and a specially designed rubber-in-shear element in series for high frequency attenuation.

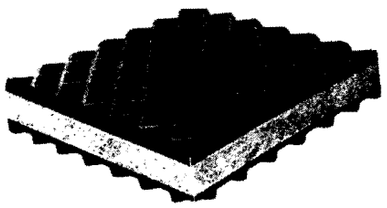
RUBBER AND CORK

Rubber and cork provide good sound insulation and can be used effectively to prevent vibration and shock transmission in non-critical installations. For vibration isolation they are primarily limited to medium and high speed equipment. (See "Type of Vibration Control," page 3.)

Individual molded rubber mountings are generally economical only with light and medium weight machines, since heavier capacity mountings approach the cost of the much more efficient steel spring isolators. Pad type rubber isolation has no such limitations. Rubber is not affected by acids or alkalis, but is not recommended for use in the presence of sunlight. Temperature range: Natural Rubber, −50° to +150°F.; synthetic, −20° to +300°F. Synthetic rubber is recommended for applications exposed continuously to oil. It is excellent in controlling high frequency disturbance and structural borne noise. The average life of rubber is about 7 years under non-impact and about 5 years under impact applications, considerably greater for pure sound insulation (e.g., pads under spring isolators).

Cork can be used directly under machines, but is most often used under concrete foundations. It is not affected by oils, acids normally encountered, or temperatures between 0°F. and 200°F., but is attacked by strong alkaline solutions and will rot under continual cycles of moistening and drying. Cork under concrete foundations still giving good service after 20 years proves a long useful life when properly applied.

(6) Elasto-Rib — high resiliency pad type isolation material



1" thick—max. sheet size 24" x 36"

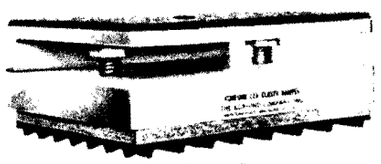
Korfund Elasto-Rib has a core of high-grade cork plate, permanently bonded between two layers of waffle embossed, oil resistant synthetic rubber.

Elasto-Rib simplifies machine installations—it prevents marring floors by equipment, resists any tendency for machines to "walk," and the resiliency of the rubber compensates for slight irregularities in the floor surface. It is excellent in eliminating transmission of high frequency disturbances; i.e., noise. Installation is simple; no fastening to the floor is normally required. If desired, cement to the machine and floor with Korfund cement.

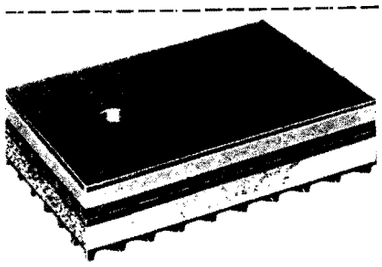
Elasto-grip—oil resistant synthetic rubber waffle is available without cork center. Single sheets, flat on one side, are ¼" thick. May also be bonded together back-to-back to form a double waffle unit ½" thick.

Wide effective load range: 7-60#/sq. in. Suggested loadings: 50#/sq. in. for engines, compressors, fans; 40#/sq. in. for punch presses, shears, etc. For loadings above 8500#/sq. in. High Capacity Elasto-Rib is available; a load range of 20-180#/sq. in.

(7) Elasto-Rib dampers



type EL Lev-Elasto Damper



type EU Elasto-Rib Damper

Universal Elasto-Rib Dampers, Series E, have a load distributing steel plate with non-skid felt pad, permanently bonded to the Elasto-Rib pad, for use where the machine leg is smaller than the area of pad required, or where leveling adjustment is required.

The Lev-Elasto Damper, Type EL, features a leveling device providing up to ¾" adjustment. By eliminating shims and lag bolts, machines can be installed in minutes. It accommodates all job conditions because its internal adjustment permits installation anywhere under machines, regardless of position or availability of bolt holes in the machine base.

The Type EU Elasto-Rib Damper, used when a mounting without built-in leveling is needed, has an offset hole drilled thru it. Machine may normally be placed on it without any fastening, or may be cemented or bolted. Damper may also be used if machine has built-in leveling bolt; specify if this arrangement is to be used when ordering sizes EU-60 thru 120.

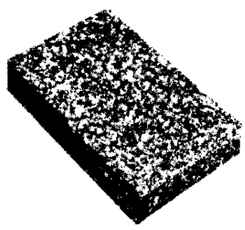
damper size*	maximum load lbs.§	Elasto-Rib pad size	minimum hite EL†
4	390	2¾x2½	—
5	545	4x2½	1¾
8	785	2¾x2½	—
10	1,090	4x2½	1¾
14	1,440	6x4	1⅞
21	2,100	7x5	2
28	2,880	6x4	1⅞
42	4,200	7x5	2
60	6,000	12½x8	2⅜
85	8,500	10x7	2¼
120	12,000	12½x8	2⅜

* When ordering use prefix EL or EU. EL not made in sizes 4 or 8.

† All EU dampers are 1½" high.

§ Reduce by ⅓ for shock application.

(8) cork — Armstrong's Vibracork and Korfund light density machinery cork

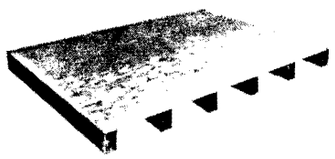


maximum sheet size 12" x 36"

Machinery isolation cork plates are strong and durable resilient boards made of pure granules of cork, without any foreign binder, compressed and baked under pressure with accurately controlled density. They can be installed directly under many machines. For large foundations in pits, plates of cork are applied directly to the bottom and sides of the foundation pit, covered with asphalt felt, and joints are sealed with asphalt, presenting an unbroken, watertight form into which the concrete is poured. Cork plates can also be furnished with asphalt felt top and bottom in sheets 36" x 48".

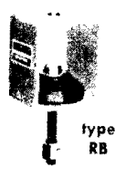
Load Ranges: Korfund Light Density Machinery Cork (2" and 3" thick) 400-1500 lbs. per sq. ft.; Armstrong's Standard Density Vibracork (2" and 3" thick) 1500-4500 lbs. per sq. ft.; Armstrong's Heavy Density Vibracork (1", 2" and 3" thick) 4500-8500 lbs. per sq. ft.

(9) Panel Seismo-Damper

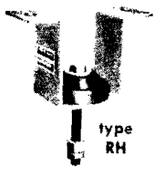


Load Range: 250# per sq. ft to 4500# per sq. ft. Recommended for jobs involving very unequal or light load distribution. Provides maximum cork effectiveness. Consists of cork pads described in Item 8, bonded to underside of heavy plywood panel on which concrete is poured. Area and placement of cork is determined for optimum loading in accordance with weight distribution. Nominal thicknesses: 2" and 3".

(10) series R rubber-in-shear hangers



type RB



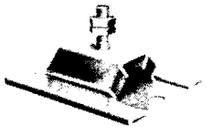
type RH

Load Range: 10-2,300#. Rubber-in-shear mountings designed for use in suspended installations. Safety feature eliminates the possibility of equipment falling in the event of damage to the rubber. For suspended equipment such as air conditioning machines, acoustical ceilings, and overhead piping. These units are excellent for attenuating high frequency disturbances and structure-borne noise. Available in box-type or open housings.

(11) rubber-in-shear units for floor mounting

type D
load range:
100-1600#

type RA
load range:
10-4000#



type RMG
load range:
30-85#/in.
of length

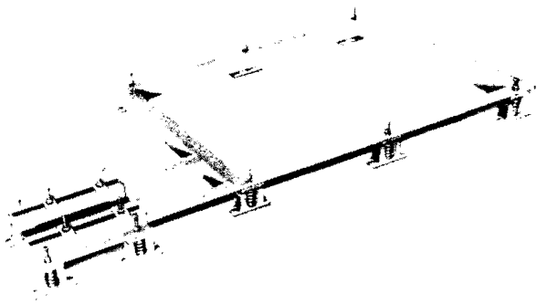
These are low cost, efficient isolation mountings and are excellent for use within the limitations discussed for rubber on page 6. There is a wide range of designs for loads from 5 pounds to 5000 pounds per mounting.

type D: A universal type of mount for non-bolted applications. Can be bolted to floor if necessary.

type RA: For bolted applications. Available in 5 sizes, each in 5 different rubber durometers to provide the greatest deflection over a wide range of loadings.

type RMG: Length 1½" to 18". Loading determines length of mount. For bolted applications.

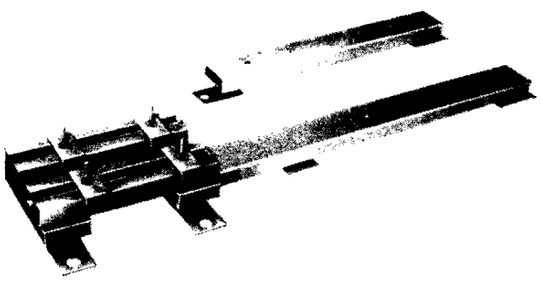
(12) spring isolated fan and motor bases



The highest possible isolation efficiencies are obtained through the use of spring isolated structural steel bases, due to the greater static deflections obtainable from spring isolators. The lower the speed of the equipment, the greater must be the static deflection in the mounting.

The great majority of these spring suspended bases utilize the series L mounting as the isolation medium. (Item 1). For very low speed fans or where fans are mounted on weak upper floors, the types UP or US mountings are used. (Item 4).

(13) Integral rubber-in shear or cork isolated



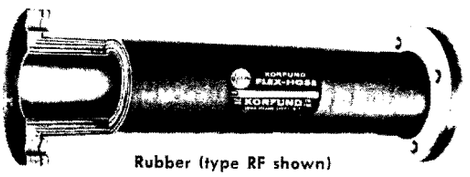
The Korfund Integral design offers maximum strength because of its rigid one-piece integral construction. It provides the best possible isolation obtainable from a commercial rubber-in-shear or cork base, and offers the following advantages:

- integrally welded structural sections
- top channel is drilled and tapped to match the equipment mounting holes, providing a template for rapid and accurate installation.
- also available with built-in motor slide rail adjustment, costing less than separate slide rail bases.

DUPLEX TWIN RAIL DESIGN ALSO AVAILABLE

(14) types F, B, S & R Flex-Hose

Metal (type F shown)



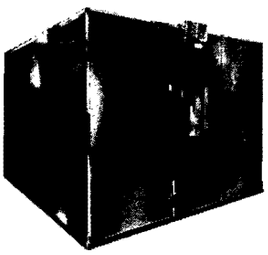
Rubber (type RF shown)

Flexible connectors, available in both metal and rubber, are used to stop the transmission of vibration and noise thru the rigid piping of air conditioning and other systems. When used in conjunction with properly applied vibration isolators, Korfund Flex-Hose helps assure maximum quiet in machinery installations.

Metal hose—Type F, seamless bronze tubing, is used for Freon connections. Fits a range of sizes of copper tubing from ¼" O.D. to 4⅛" O.D. Series B & S seamless bronze or steel tubing is a general purpose hose, available with 4 types of end fittings. Fits a range of pipe sizes from ¼" I.D. to 16" I.D.

Rubber hose—Consists of an inner tube of gum rubber or specially compounded synthetic stock, protected by wire-reinforced flexible carcass of multiple plies of woven duck and rubber, covered with an outer wrap. Type RHM has threaded hex end connections, and fits a range of pipe sizes from ½" I.D. to 4" I.D. Type RF has flanged end connections, and fits a range of pipe sizes from 2½" I.D. to 12" I.D.

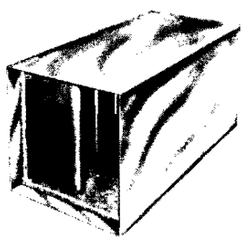
(15) acoustical products



acoustical enclosures

The use of acoustical machine enclosures, panels, and baffles to reduce noise levels has proved highly effective in raising employee efficiency and preventing loss of hearing and nervous disorders.

Sound proof rooms are highly necessary for precise testing purposes. Korfund will design audiometric chambers, acoustical enclosures, or panels to your specific requirements.



Hush-A-Duct

duct sound traps

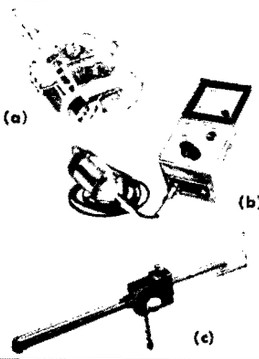
Designed to reduce noise created by prior elements in air distribution systems. These products give maximum attenuation in a fixed distance with a minimum pressure drop.

No special mounting required, may be installed by sheet metal contractor.

Hush-a-Duct—Rectangular shaped units for use in low pressure systems. Sizes from 12"x14" to 60"x70" with air volumes from 600 to 100,000 CFM are available.

Hush-a-Tube—Tubular units for high pressure duct systems. Inside diameters from 14" to 46".

(16) vibration measurement



Hand Vibrograph (a)

The Korfund Hand Vibrograph is a light-weight, hand-held, mechanical instrument which magnifies and permanently records frequency, amplitude and wave form of vibrations and other mechanical motions. It is used for detecting and recording vibrations in machinery and structures, and can greatly simplify the scheduling of maintenance operations. Operating ranges: frequency—0 to 20,000-cpm.; amplitudes—0.0004" to 0.8"; amplification—2 to 20 times.

Sine Vibrometer (b)

The Sine Vibrometer is a new instrument for measuring mechanical vibrations. Available as a portable test unit or for switch board mounting for vibration monitoring of up to 12 locations. Consists of two parts, a vibration pick-up which is pressed or fastened to the vibrating part, and a direct reading meter. Units are self contained and do not require an electrical supply. Units have up to 3 scale ranges from 0 to 0.004 to 0.040 inches.

Reed Vibrometer (c)

The Korfund Reed Vibrometer indicates frequency and amplitude of vibratory disturbances and is exceptionally useful where no recording is required. It has an electrical as well as mechanical output. This extremely compact unit is excellent for measuring machine speeds, and has a full frequency range from 120 to 15,000-cpm, with an accuracy of ±3% at all frequencies.

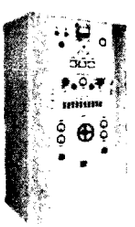
RESEARCH AND DEVELOPMENT FACILITIES

Backed by over 50 years of experience in the field of vibration, shock, and noise isolation, the Korfund Co., Inc. now offers its services for research and development work. These facilities have recently been expanded to include a number of prominent consultants and consulting organizations who are available to help in solving your isolation problems. With its affiliated company, Federal Shock Mount Corp., Korfund has extended activities in the electronic component fields contributing to aeronautical and missile applications.

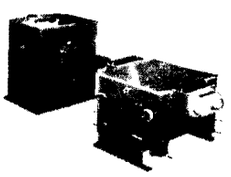
test facilities

Korfund has all the facilities to perform complete vibration and shock tests on all equipment and structures. Certified performance data is available for vibration frequencies to 3,000 cps., and shock to 100 g's. Korfund is approved by the Military for qualification testing. Illustrated is just some of the equipment necessary for the development of advanced vibration and shock mounting systems.

M-B Model C10 exciter



M-B control panel



L.A.B. type RVH 30-300 vibrometer

Mounting systems for electronic and electro-mechanical devices available thru Federal Shock Mount Corp., Div. of Korfund

KORFUND

THE KORFUND COMPANY, INC.

Specialists in vibration, shock, and noise control and measurement

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